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A

Patent Application Transmittal

(only for new nonprovisional applications under 37 C.F.R. 1.53(b))

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10025 U.S. PTO
09/596174



Date: June 16, 2000

Attorney Docket No.: 450100-2828.7

ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Sir:

With reference to the filing in the United States Patent and Trademark Office of an application for patent in the names of: Teruhiko Kori, Harumi Kawamura, Hisato Shima and Kazuyuki Ogawa

entitled: METHODOLOGIES FOR REPRODUCING VIDEO SIGNALS STORED ON MEDIA WHICH INCORPORATE SEPARATE MEMORY CIRCUITS

X Continuing Application

X Continuation Divisional Continuation-in-Part (CIP)
of prior application Serial No. 09/390,385, filed September 3, 1999,
which is a continuation of 08/774,893, filed December 27, 1996, which is
a continuation of application Serial No. 08/433,004, filed May 2, 1994,
which is a divisional of application Serial No. 08/094,428, filed July
21, 1993.

[Note: If priority under 35 U.S.C. 120 involves a series of respectively copending applications, then in this amendment identify each and its relationship to its immediate predecessor.]

X The prior application is assigned of record to Sony Corporation.

 This is an application of a small entity under 37 CFR 1.9(f) and the amounts shown in parentheses below have been employed in calculating the fee:

- Small Entity Verified Statement(s) is (are) enclosed.
- Small Entity Verified Statement(s) filed in prior application, status still proper and desired

The following are enclosed:

- X Specification (43 pages)
- X 27 Sheets of Drawings
- X 10 Claims (including 2 independent claims)
- This application contains a multiple dependent claim

X Our check for \$690.00, calculated on the basis of the claims as amended by any enclosed preliminary amendment as follows:

Basic Fee, \$690.00 (\$345.00)	\$690.00
Number of Claims in excess of 20 at \$18.00 (\$9.00) each:	
Number of Independent Claims in excess of 3 at \$78.00 (\$39.00) each:	
Multiple Dependent Claim Fee at \$260.00 (\$130.00)	
Total Filing Fee	\$690.00
Assignment Recording Fee \$40.00	

x This application is being filed within the third month following the expiration of the term originally set therefor in the prior application. This is a petition to request a three-month extension of time. A check covering the cost of the petition is enclosed.

10541 U.S. PTO
06/16/00

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Patent Application Transmittal

(only for new nonprovisional applications under 37 C.F.R. 1.53(b))

450100-2828.7

X Oath or Declaration and Power of Attorney

___ New ___ signed ___ unsigned

X Copy from a prior application (37 C.F.R. 1.63(d))

Deletion of Inventors

___ Signed Statement attached deleting inventor(s) named in the prior application (37 C.F.R. 1.63(d)(2) and 1.33(b))

Power of Attorney or Correspondence Address Change

X Power of attorney and/or correspondence address was changed during prosecution of the prior application. The new power of attorney is to William S. Frommer, Reg. No. 25,506. The new correspondence address is indicated above.

X Incorporation by Reference (for continuation or divisional application) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

X A Preliminary Amendment is enclosed.
(Claims added by this amendment have been properly numbered consecutively beginning with the number next following the highest numbered original claim in the prior application.)

___ Cancel in this application original claims ___ of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

___ New formal drawings are enclosed.

X Certified copy of each foreign priority application on which the claim for priority under 35 U.S.C. 119 is based was filed in prior U.S. application Serial No. 08/094,428, filed July 21, 1993. A list of said foreign priority application(s) is (are) provided below. Acknowledgement thereof is requested.

Application No.

Filed

In

04-217503

July 24, 1992

Japan

Please charge any additional fees required for the filing of this application or credit any overpayment to Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicant(s)

By William S. Frommer
William S. Frommer
Reg. No. 25,506



PATENT
450100-2828.7

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Teruhiko Kori et al.
Serial No. : Continuation of 09/390,385
Filed : Herewith
For : **METHODOLOGIES FOR REPRODUCING VIDEO
SIGNALS STORED ON MEDIA WHICH INCORPORATE
SEPARATE MEMORY CIRCUITS**
Examiner : Andrew L. Snieszek
Art Unit : 2753

745 Fifth Avenue
New York, New York 10151

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Date of Deposit June 16, 2000
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Edward Nay

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PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified Continuation application, please
amend the application as follows.

IN THE CLAIMS

Please cancel claims 1-27.

Please add new claims 28-37 as follows:

--28. A method for reproducing information representative of signals recorded on a recording medium, said information including at least one image data that is derived from a moving image signal, wherein said recording medium is accommodated within a recording medium cartridge that includes a memory device separate from said recording medium, the method comprising the steps of:

loading said recording medium cartridge into a recording and reproducing apparatus that is operatively connected to a display device;

transmitting at least some of said information from said memory device included in said recording medium cartridge to said display device; and

displaying at least some of said transmitted information on said display device including displaying said at least one image.--

--29. The method according to claim 28, wherein said recording medium is a .magnetic tape.--

--30. The method according to claim 28, wherein said signals recorded on said recording medium include at least one video signal.--

--31. The method according to claim 28, wherein said information stored in said memory device includes text data.--

--32. The method according to claim 28, wherein said information includes a custom file, said custom file identifying at least two of said signals recorded on said recording medium and specifying a predetermined order for said identified signals, said predetermined order being different from the order in which said signals are recorded on said recording medium; wherein said custom file is used to reproduce said identified signals according to said predetermined order.--

--33. A method for reproducing information representative of signals recorded on a recording medium, said information including at least one image data that is derived from a moving image signal, said recording medium being accommodated within a recording medium cartridge that includes a memory device separate from said recording medium, wherein said information is stored in said memory device in the form of a plurality of data packets, the size and format of said data packets having been determined prior to the storing of said information in said memory device, and wherein said information is organized according to a hierarchical structure, the hierarchical structure including at least two levels and being capable of accommodating more than two levels, the method comprising the steps of:

loading said recording medium cartridge into a recording and reproducing apparatus that is operatively connected to a display device;

transmitting at least some of said information from said memory device
included in said recording medium cartridge to said display device; and
displaying at least some of said transmitted information on said display device
including displaying said at least one image.--

--34. The method according to claim 33, wherein said recording medium is a
magnetic tape.--

--35. The method according to claim 33, wherein said signals recorded on said
recording medium include at least one video signal.--

--36. The method according to claim 33, wherein each of said data packets includes a
level code indicative of the level within said hierarchical structure to which the data packet
corresponds.--

--37. The method according to claim 33, wherein said information includes a custom
file, said custom file identifying at least two of said signals recorded on said recording
medium and specifying a predetermined order for said identified signals, said predetermined
order being different from the order in which said signals are recorded on said recording
medium; wherein said custom file is used to reproduce said identified signals according to
said predetermined order.--

REMARKS

This Amendment is submitted prior to examination of the above-identified Continuation application. Claims 1-27 are pending in the Continuation application. In this Amendment, claims 1-27 have been canceled, and new claims 28-37 have been added.


Claims 28-37 thus remain for consideration.

If any issues remain, or if the Examiner has any further suggestions, he/she is invited to call the undersigned at the telephone number provided below.

The Examiner is hereby authorized to charge any insufficient fees or credit any overpayment associated with the above-identified application to Deposit Account No. 50-0320.

The Examiner's consideration of this matter is gratefully acknowledged.

Respectfully submitted,



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PATENT
450100-2828

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION FOR LETTERS PATENT

Title: RECORDING MEDIUM CARTRIDGE WITH MEMORY CIRCUIT

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00959614-051600

BACKGROUND OF THE INVENTION

This invention relates to a recording medium cartridge of the type which includes a memory for storing information concerning signals recorded on the recording medium, and more particularly is related to a manner of storing information in the memory of such a recording medium cartridge so as to promote higher efficiency in the management and retrieval of the information stored in the memory and of the signals recorded on the recording medium.

In a known type of recording medium cartridge, such as a magnetic tape cassette, information concerning the magnetic tape, such as the thickness, the type, the length, the grade, etc., of the magnetic tape, can be determined on the basis of a plurality of detection holes (hereinafter referred to as "recognition holes") that are provided at a corner of the rear face of the cassette.

However, as the size of cartridges has been reduced, it has become increasingly difficult both to provide locations for the recognition holes and to provide a desired amount of information using the number of recognition holes which are available.

Moreover, in order to determine what materials are recorded on the magnetic tape, it is necessary to advance or rewind the magnetic tape to reach the position on the tape at

1 which the material of interest is recorded. This often requires
2 a significant period of time.

3 To overcome these problems, it has been proposed to
4 include in a recording medium cartridge a memory, separate from
5 the magnetic tape, for storing information with respect to the
6 cartridge and the materials recorded on the tape. Such a
7 recording medium cartridge is disclosed, for example, in U.S.
8 Patent Nos. 4,338,644 and 4,383,285.

9 With a recording medium cartridge of the type just
10 described, having a memory for storing information concerning the
11 materials recorded on the recording medium, it is important that
12 the information stored in the memory accurately reflect the
13 materials recorded on the recording medium and also that the
14 information stored in the memory be managed efficiently.
15 However, the prior art fails to disclose any system for managing
16 the information stored in the memory.

17 OBJECTS AND SUMMARY OF THE INVENTION

18 Accordingly, it is an object of the present invention
19 to provide a method of storing information in the memory of a
20 recording medium cartridge using a predetermined technique which
21 facilitates efficient management of the materials recorded on the
22 recording medium.

23 Another object is to divide the program materials
24 recorded on the recording medium into a number of separate groups
25 corresponding to different categories of programs and to organize

1 the groups in the form of a hierarchic or tree structure to
2 facilitate management of the program materials.

3 A further object of the invention is to provide a
4 recording medium cartridge having a memory for storing
5 information concerning programs recorded on the recording medium,
6 with the information being stored so as to divide the programs
7 into groups for facilitating classification of the programs and
8 searching for, and reference to, the recorded programs.

9 In accordance with an aspect of the present invention,
10 a method of storing information representative of signals
11 recorded on a recording medium accommodated within a recording
12 medium cartridge includes the steps of providing a memory device
13 as part of the recording medium cartridge and storing the
14 information in the form of a tree structure that includes at
15 least a plurality of directory entries each having associated
16 therewith a plurality of data items. Each of the data items
17 represents a respective portion of the signals recorded on the
18 recording medium, and contains data indicative of a starting
19 position and a ending position on the recording medium of the
20 respective portion of the signals.

21 According to another aspect of the invention, at least
22 some of the data items are formed of at least one data packet and
23 each data packet has a fixed length and a predetermined format
24 and includes a level code indicative of a level of the tree

1 structure, the data packet being assigned to that level of the
2 tree structure.

3 According to a further aspect of the present invention,
4 there is provided a method of retrieving information
5 representative of signals recorded on a recording medium
6 accommodated within a recording medium cartridge, with the
7 information having been stored in the form of a tree structure in
8 a memory device provided as part of the recording medium
9 cartridge and the method including the steps of loading the
10 recording medium cartridge in a recording and reproducing
11 apparatus that is operatively connected to a display device, and
12 displaying at least some of the information on the display
13 device. According to further aspects of the invention the
14 signals recorded on the recording medium include video signals,
15 the display device is a video monitor or a television receiver,
16 the information stored in the memory device includes image data
17 representative of respective portions of the video signals and
18 the displaying step includes displaying a plurality of images
19 simultaneously in split-screen form, with each of the displayed
20 images representing a respective portion of the video signals
21 recorded on the recording medium.

22 According to yet another aspect of the invention, there
23 is provided a recording medium cartridge which includes a
24 housing, a recording medium accommodated within the housing, a
25 memory device carried by the housing, and terminals associated

1 with at least one outer surface of the housing for providing
2 electrical connections between the memory device and a
3 reproducing apparatus with which the cartridge is to be used.
4 The memory device has stored therein data signals representative
5 of program information recorded on the recording medium. The
6 data signals are stored in the form of a tree structure including
7 at least a plurality of directory entries each having associated
8 therewith a plurality of data items. Each of the data items
9 represents a respective portion of the program information, and
10 contains data indicative of a starting position and an ending
11 position on the recording medium of the respective portion of the
12 program information.

13 The information storage and retrieval methods and the
14 recording medium cartridge as just described permit efficient
15 management of the stored information relating to the recorded
16 program materials and provide for rapid and convenient access to
17 the recorded program materials.

18 The above, and other objects, features and advantages
19 of the present invention will be apparent from the following
20 detailed description thereof which is to be read in connection
21 with the accompanying drawings.

22 BRIEF DESCRIPTION OF THE DRAWINGS

23 Figs. 1(a) and 1(b) diagrammatically illustrate a basic
24 data item used in forming a data structure according to the
25 present invention;

1 Fig. 2 schematically illustrates a portion of a signal
2 that is recorded on magnetic tape and which corresponds to one of
3 the data items of Figs. 1(a) or 1(b);

4 Fig. 3 diagrammatically illustrates an extended data
5 item in which additional information has been added to the basic
6 data item of Figs. 1(a) or 1(b);

7 Fig. 4 diagrammatically illustrates another extended
8 data item with further information added to the data item of Fig.
9 3;

10 Fig. 5 diagrammatically illustrates still another
11 extended data item formed by adding image data to a basic data
12 item;

13 Fig. 6 diagrammatically illustrates a tree structure
14 formed using basic data items;

15 Fig. 7 schematically illustrates signals recorded on a
16 magnetic tape and corresponding to the tree structure of Fig. 6;

17 Fig. 8 schematically illustrates tree structure levels
18 characteristic of pre-recorded tapes and user tapes;

19 Fig. 9 diagrammatically illustrates a complete tree
20 structure formed using basic data items;

21 Fig. 10 diagrammatically illustrates a sequence of
22 memory locations in which are stored data items corresponding to
23 the tree structure of Fig. 9;

24 Fig. 11 diagrammatically illustrates another tree
25 structure formed using basic data items;

1 Fig. 12 diagrammatically illustrates a tree structure
2 which includes a directory entry corresponding to a highlight
3 scene;

4 Fig. 13 diagrammatically illustrates a tree structure
5 including a directory entry which corresponds to a custom file;

6 Fig. 14 diagrammatically illustrates a hierarchic data
7 structure corresponding to a blank cartridge;

8 Fig. 15 is a flow chart which illustrates a procedure
9 for managing information with respect to either a blank or a
10 recorded cartridge;

11 Fig. 16 diagrammatically illustrates in the form of a
12 tree structure automatic creation of directory entries during
13 signal recording operations in accordance with the present
14 invention;

15 Fig. 17 diagrammatically illustrates creation of a new
16 directory entry within the tree structure shown in Fig. 16;

17 Fig. 18 diagrammatically illustrates application of a
18 title to the new directory entry of Fig. 17;

19 Fig. 19 diagrammatically illustrates association of
20 program segments with the new directory entry of Figs. 17 and 18;

21 Fig. 20 diagrammatically illustrates addition of a new
22 data item to the tree structure of Fig. 19 upon commencement of a
23 signal recording operation;

1 Fig. 21 diagrammatically illustrates modification of
2 the tree structure of Fig. 20 by the addition of another
3 directory entry with program segments associated therewith;

4 Fig. 22 diagrammatically illustrates modification of
5 the tree structure of Fig. 21 by applying a title to a previously
6 untitled directory entry;

7 Fig. 23 diagrammatically illustrates a tree structure
8 for information stored with respect to program materials on a
9 pre-recorded tape;

10 Fig. 24 schematically illustrates recorded signal
11 portions selected to form a digest of a program on a pre-recorded
12 tape;

13 Fig. 25 diagrammatically illustrates a tree structure
14 which includes a directory entry corresponding to the digest
15 illustrated in Fig. 24;

16 Fig. 26 is a table which illustrates the format of a
17 data packet used for storing information in the memory of a
18 recording medium cartridge in accordance with the present
19 invention;

20 Fig. 27 is a table which shows codes to be used in the
21 data packet of Fig. 26 for identifying a level to which the data
22 packet is assigned in a tree structure;

23 Fig. 28 is a perspective view of a recording medium
24 cartridge provided with a memory device in accordance with the
25 present invention;

Fig. 29 is a cross-sectional view of a portion of the recording medium cartridge of Fig. 28;

Fig. 30 is a semi-schematic perspective view of a printed wiring board embodying the memory device incorporated in the recording medium cartridge of Fig. 28;

Fig. 31 is a simplified block diagram illustrating a system in which the recording medium cartridge of Fig. 28 may be used;

Fig. 32 is a flow chart of a procedure for entering data items in a recording medium cartridge memory in accordance with the present invention;

Fig. 33 illustrates a screen display viewed by the user during entry of text information into the recording medium cartridge memory;

Fig. 34 illustrates a screen display of information stored in the recording medium cartridge memory; and

Fig. 35 shows a split-screen display containing multiple images reproduced from image data stored in the recording medium cartridge memory and representing respective recorded program segments.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring initially to Fig. 28, a recording medium cartridge 31, in accordance with an embodiment of the invention, includes a case 32 that is formed in the shape of a flat, rectangular box by joining together a top half case 36 and a

1 bottom half case 37. The recording medium cartridge 31 also
2 includes a pair of tape reels 33 disposed within the case 32, and
3 an IC plate 34 carried within the case 32 and provided with
4 terminals 35 accessible from outside of the case 32.

5 The case 32 includes a bottom wall 38 having formed
6 therein holes 39 for providing access to the tape reels 33 and
7 terminal slots 40 for providing access to the terminals 35 of the
8 IC plate 34. The bottom wall 38 also includes a recess 41 across
9 which a magnetic tape (not shown) is extended. It will be
10 understood that the magnetic tape, which is not shown, is wound
11 in a conventional manner on the tape reels 33. The cartridge 31
12 also includes a lid 42 which is displaceable in a conventional
13 manner between a closed position which protects the tape and
14 covers a front opening of the case 32 and an open position which
15 exposes the magnetic tape.

16 Referring now to Figs. 29 and 30, the IC plate 34
17 includes a printed wiring board 44 having terminals 35 formed
18 thereon. An IC chip 45, i.e., a semiconductor memory device, is
19 mounted on the printed wiring board 44. The IC plate 34 is
20 retained in a shallow, substantially rectangular recess 43 that
21 is formed in the inner surface of the bottom wall 38 of the case
22 32 at the middle of a rear portion of the bottom wall 38. The
23 four terminal slots 40 are arranged laterally in the recess 43.
24 The IC plate 34 and recess 43 are dimensioned so that the IC
25 plate 34 fits snugly in the recess 43.

1 The terminals 35 are rectangular and are elongated in
2 the widthwise direction of the case 32. The terminals 35 extend
3 in parallel and are arranged in a sequence in the lengthwise
4 direction of the case 32 in positions corresponding to respective
5 terminal slots 40. The terminals 35 are preferably gold-plated
6 to provide lasting and reliable electrical contacts.

7 A circuit pattern formed on the printed wiring board 44
8 connects the terminals 35 with the IC chip 45. The terminals 35
9 include, for example, a power supply terminal 35a, a data
10 input/output terminal 35b, a clock terminal 35c, and a ground
11 terminal 35d. The IC plate 34 is secured within the recess 43 of
12 the bottom wall 38 by welding, an adhesive or the like, and is
13 positioned with the IC chip 45 facing downwardly with respect to
14 the case 32 and the terminals 35 presented for access via
15 respective terminal slots 40.

16 Fig. 31 schematically illustrates a video system 50 in
17 which the recording medium cartridge 31 (in this case a video
18 tape cassette) may be used. The video system 50 includes a video
19 tape recorder (VTR) 51 in which the tape cassette 31 is inserted
20 and which is connected to a television receiver 52 for display of
21 video signals reproduced from the cassette 31. A remote control
22 unit 54 is provided for a user to enter control commands for the
23 VTR 51, and an antenna 56 is provided as a signal source for the
24 VTR 51.

1 Video signals received via antenna 56 are supplied to a
2 tuner 58 and a tuned signal output from the tuner 58 is processed
3 by a video signal processor 60 for recording on a magnetic tape 6
4 accommodated within tape cassette 31.

5 The VTR 51 also includes an output processor 62 which
6 processes video signals reproduced from the tape 6 of tape
7 cassette 31 and outputs the processed signals for display by the
8 TV receiver 52. Although not explicitly shown in the simplified
9 block diagram of Fig. 31, it should be understood that the VTR 51
10 includes a rotary magnetic recording head and associated
11 circuitry for recording on the magnetic tape 6 the signal
12 provided by video signal processor 60 and for reproducing from
13 the magnetic tape 6 a signal to be processed by output processor
14 62.

15 The IC memory chip 45 carried in tape cassette 31 is
16 connected for data communication, via at least one of the
17 terminals 35 (Figs. 28-30), with a microprocessor 64 provided
18 within VTR 51 (Fig. 31). The microprocessor 64 may, for example,
19 be the primary control circuit for controlling all the operations
20 of VTR 51. Accordingly, microprocessor 64 is connected for
21 receiving command signals from the remote control unit 54 by way
22 of remote receiving circuitry 66 which is in communication with
23 the remote control unit 54 via a wireless signal path 68. It
24 will be understood that the microprocessor 64 has associated

1 therewith conventional circuits such as program memory and
2 working memory, which are not separately shown.

3 The VTR 51 also includes a VBI decoder 70 which
4 separates vertical blanking interval code signals from the tuned
5 video signal provided by tuner 58 and provides decoded signals to
6 the microprocessor 64. VTR 51 also includes a frame memory 72
7 which stores one or more frames of reproduced video signals
8 output from output processor 62 and provides the signals, in the
9 form of digital data, to the microprocessor 64.

10 The microprocessor 64 is also preferably employed for
11 controlling advancing or rewinding of the magnetic tape 6 by
12 means of a tape transport mechanism that is not shown in Fig. 31.
13 The microprocessor 64 accordingly has access to data indicative
14 of the position of tape 6 relative to the winding or unwinding
15 thereof within cassette 31.

16 The manner of storing data in the memory 45 of the
17 video tape cassette 31 will now be described. Referring
18 initially to Figs. 1(a) and 1(b), a basic data item 1 represents
19 a minimum unit of data stored in the memory 45 for the purpose of
20 keeping track of video signals recorded on the tape 6 of tape
21 cassette 31. As shown in Fig. 1(a), the data item 1 includes a
22 time code 2 which represents a starting point of a recorded video
23 signal portion and a time code 3 which represents the end point
24 of the video signal portion. Alternatively, the basic data item
25 may take the form of the data item 1' (Fig. 1(b)), in which the

1 starting point of the signal portion is represented by a track
2 number 2' and the ending point is represented by a track number
3 3'. In the following description, it will be assumed that the
4 data item 1, including time codes, is used, rather than the data
5 item 1', which includes track numbers.

6 The data item 1 corresponds, as shown in Fig. 2, to a
7 video signal that is recorded at a particular section 7 of a
8 magnetic tape 6 wound around reels 33 of the video tape cassette
9 31. The recorded area 7 is defined by a starting point 8 which
10 corresponds to the time code 2 of the data item 1 and by an
11 ending point 9 which corresponds to the time code 3 of the data
12 item 1. The length of the recorded area 7 is arbitrary, and may
13 be fixed as the area corresponding to one frame or may be of
14 variable length corresponding, for example, to a recorded
15 program.

16 The basic data item 1 can be extended by addition of
17 data of various types. For example, and as shown in Fig. 3, text
18 data representing a program name 10 can be added to the data item
19 so that the data item includes the program name data 10 in
20 addition to the starting time code 2 and the ending time code 3.
21 It will be appreciated that the program name 10 may be, for
22 example, the title of a movie recorded in the tape area defined
23 by the starting and ending time codes.

24 Further, as shown in Fig. 4, the data added to the data
25 item 1 may include, in addition to the program name 10, a program

1 number 11 and a date of recording 12. For example, the program
2 number 11 may be "program 1", the program name 10 may be
3 "overseas tour" and the date may be "May 5, 1992".

4 In each of the examples described with respect to Figs.
5 3 and 4, the additional information has been in the form of text
6 information. Alternatively, however, the additional information
7 may take the form of image data 13 (as shown in Fig. 5) which
8 represents an image indicative of the contents of the video
9 signal recorded in the tape area defined by the time codes 2 and
10 3. In the particular example shown in Fig. 5, it will be noted
11 that the additional information includes both image data 13 and a
12 program name 10. Thus, it will be seen that mixed types of data
13 may be included in the additional information added to the basic
14 data item 1. The types of data may include text data, image
15 data, audio data, executable software files, codes indicative of
16 copyright protection, and so forth.

17 There will now be described a data structure based upon
18 the fundamental data items as shown in Fig. 1 and used for
19 storing the data in the memory 45 of tape cassette 31. It will
20 be understood that if a number of recording operations are
21 performed using the tape cassette 31 so that a number of video
22 signal portions are formed in respective areas of tape 6, then a
23 corresponding number of basic data items 1 will be accumulated in
24 the memory 45.

1 For example, as shown in Fig. 6, if three programs have
2 been recorded on the tape, there are three data items present in
3 the memory 45, each corresponding to a respective one of the
4 three programs. A first one of the three data items includes a
5 time code TC1 representing a starting point, and a time code TC2
6 representing an ending point, of the first program as well as a
7 first program name corresponding to the first program. With
8 respect to the second program, there is a second data item
9 including a starting time code TC3, an ending time code TC4, a
10 second program name and a recording date. Similarly, with
11 respect to a third program, there is a third data item including
12 a starting time code TC5, an ending time code TC6, and a third
13 program name.

14 The corresponding tape areas having the respective
15 programs recorded thereon are schematically shown in Fig. 7, with
16 the area in which the first program is recorded being defined by
17 time codes TC1 and TC2, the area in which the second program is
18 recorded being defined by time codes TC3 and TC4 and the area in
19 which the third program is recorded being defined by time codes
20 TC5 and TC6.

21 It should be understood that each of these areas may
22 represent either a recorded portion or a blank portion of the
23 tape. Of course, when the respective area is blank, the
24 corresponding data item includes only the starting and ending

1 time codes, and does not include additional information such as a
2 program name or a recording date.

3 As illustrated in Figs. 6 and 7, the three programs may
4 be formed into a group under a descriptive name such as "drama"
5 which may be applied to the group. In particular, a hierarchic
6 or tree data structure is formed in which the three data items
7 corresponding to the three programs are associated with the group
8 name "drama". The data entry including the group name is formed
9 at a higher level of the tree structure than the level at which
10 the three program data items are formed, all of the three program
11 data items being at a common level. This structure may be
12 implemented by creating a new folder in the memory 45 with the
13 data items corresponding to the three programs being processed so
14 as belong to the new folder.

15 There will now be discussed, with reference to Fig. 8,
16 the types of data structure levels to be used in a tree or
17 hierarchy for either the pre-recorded tape (such as a movie or a
18 music recording), or for a user tape (that is, a tape on which a
19 purchaser of the tape has performed the recording).

20 Turning, then, to Fig. 8, it will be noted that three
21 types of levels are included in the tree structure for a pre-
22 recorded tape, namely a title level, a chapter level, and a part
23 level. The chapter level is for gathering a plurality of parts
24 into a group under one of the chapters and the title level is for

1 gathering a plurality of chapters together as a group in
2 association with the title.

3 On the other hand, for a user tape two levels are
4 provided, a title level and a program level. The title level is
5 for gathering together in a group a plurality of programs to be
6 associated with the title. The numbers of levels shown in Fig. 8
7 are by way of example only, and the number of levels can be
8 increased if necessary.

9 Fig. 9 shows an example of a tree structure for data
10 corresponding to video signals recorded by a user on the tape
11 cassette 31. As seen in Fig. 9, the data stored in the memory 45
12 proceeds from a root 14 into two divisions or branches, which are
13 a recording medium information branch 15 and a recorded content
14 information branch 16, the latter representing information
15 concerning the signals that have been recorded on the tape.

16 The recording medium information branch 15 includes
17 identification information 17 with respect to the recording
18 medium cartridge itself as well as miscellaneous additional data
19 18. The identification information 17 may include, for example,
20 tape thickness information 17a, tape type information 17b, tape
21 length information 17c, tape grade information 17d and a code 17e
22 for identifying the manufacturer. The miscellaneous additional
23 data 18 may include such information as date of manufacture, lot
24 number, etc.

1 The recording content information is stored in the form
2 of a tree structure, of which the highest level 19 includes
3 cartridge title information 19a and cartridge number information
4 19b. The data items for implementing the highest level 19 of the
5 branch 16 are, like the branch 15, present in the memory 45 of
6 each cartridge. It will be understood that information which
7 relates to the entire recording medium cartridge is stored in the
8 recording medium information branch 15 and in the highest level
9 19 of the recorded content information branch 16. Moreover, the
10 information stored in the recording medium information branch 15
11 is fixed, whereas the information stored in the highest level 19
12 of the other branch 16 is variable information and can be changed
13 by a user.

14 Beneath the highest level 19 of the branch 16 there is
15 provided a hierarchic structure for the rest of the branch 16,
16 including title and program information. In particular, title
17 level entries corresponding to a "MOVIE 1" and a "MOVIE 2" are
18 present. Program level entries for programs 1-3 are associated
19 with the entry for "MOVIE 1" at a program level that is below the
20 title level, and program level entries for programs 1 through 4
21 are associated with the title level entry for "MOVIE 2".

22 Fig. 10 indicates the sequence in which the information
23 illustrated in Fig. 9 is stored in the memory of the recording
24 medium cartridge. The sequence shown in Fig. 10 starts from the
25 lowest-numbered address location and proceeds to higher-numbered

1 addresses. The recording medium information is stored at the
2 beginning of the sequence, followed by the information relating
3 to the signals recorded on the tape.

4 More specifically, the common identification
5 information (corresponding to branch 15 of Fig. 9), including
6 data relating to the recording medium and data identifying the
7 manufacturer, etc., is stored first, followed by other
8 miscellaneous information. Next is the cassette identifying
9 information, such as number and title, and after that the
10 hierarchically arranged data is stored, with each item of title
11 level information being followed with the lower level (program
12 level) entries associated with the title level entry. That is,
13 the title level entry for "MOVIE 1" is followed by the three
14 program entries associated with "MOVIE 1". Then the title level
15 entry for "MOVIE 2" is stored, followed by the four program level
16 entries associated with "MOVIE 2".

17 Although Fig. 10 illustrates the data arrangement
18 corresponding to a user tape directory as shown in Fig. 9, it
19 will be understood that a similar hierarchic data arrangement is
20 used in storing directory data for a pre-recorded tape.

21 Fig. 11 shows another hierarchic directory data
22 structure for a user tape. The structure shown in Fig. 11
23 differs from that of Fig. 9 in that it has, as part of the title
24 level entry, a starting point time code and an ending point time
25 code for all of the program materials associated with the title

1 level entry. In other words, the title level entry for "MOVIE 1"
2 includes the starting point time code TC1 representing the
3 starting point on the tape of the first program associated with
4 "MOVIE 1" and also the time code TC6 representing the ending
5 point of the third and last program associated with "MOVIE 1".
6 Similarly, the title level entry for "MOVIE 2" includes a
7 starting point time code TC7 and an ending point time code TC14,
8 which respectively represent the starting point of the first
9 program, and the ending point of the fourth and last program,
10 associated with the title level entry "MOVIE 2".

11 In the directories illustrated by Figs. 9-11, the data
12 simply corresponds to the recorded materials and their respective
13 recording locations on the recording medium. However, the
14 directory structure also permits the user to create additional
15 directory entries to provide special indexing or other functions.
16 For example, the user may provide a "HIGHLIGHT SCENE" entry
17 corresponding to a particular portion of the recorded materials
18 which are of special interest to the user or which are desired to
19 be readily available for reproduction. Specifically, as shown
20 in Fig. 12, a title level entry 20 has been given the name
21 "HIGHLIGHT SCENE" and has associated therewith a starting point
22 20a and an ending point 20b which define the starting and ending
23 points of the scene which is of special interest to the user.
24 Also associated with the "HIGHLIGHT SCENE" entry is additional
25 information designated by reference numeral 21 and which is image

1 data representing a frame out of the recorded material in the
2 area defined by the starting point 20a and ending point 20b.
3 This frame may be displayed as an index or title picture to
4 identify the directory entry 20. Alternatively, or in addition
5 to the title picture data, other information, such as a scene
6 number of the like, can be included in the program level entry
7 associated with the title level entry "HIGHLIGHT SCENE".

8 In selecting and carrying out a procedure in which a
9 "highlight scene" directory entry is created, the user may be
10 guided, for example, by a series of menus and submenus displayed
11 on the screen of TV receiver 52 (Fig. 31). The character
12 information for the menus and submenus may be generated by the
13 microprocessor 64 and output via output processor 62. The menu
14 may include an item such as "CREATE HIGHLIGHT SCENE FILE". When
15 this item is selected by, for example, suitable operation of
16 remote control unit 54, submenu items and/or prompt messages such
17 as "SELECT STARTING POINT OF HIGHLIGHT SCENE FILE", "SELECT
18 ENDING POINT OF HIGHLIGHT SCENE FILE", "ENTER NAME OF HIGHLIGHT
19 SCENE FILE", "CANCEL HIGHLIGHT SCENE FILE", may be displayed by
20 the TV receiver 52 from character information generated by the
21 microprocessor 64. It will be appreciated that the menu
22 items/prompts may appear superimposed over images reproduced from
23 the recording medium. Again, selection of menu items and
24 indication of starting and ending points of the highlight scene

1 program segment may be indicated by operation of the remote
2 control unit 54.

3 As another example, and as illustrated in Fig. 13, the
4 user can create a "custom file" selected from previously recorded
5 programs. In particular, for the purposes of the example shown
6 in Fig. 13 it is assumed that ten programs have previously been
7 recorded and that the user desires to have certain of these
8 programs reproduced in an order different from the order in which
9 the programs are recorded. The directory entry 22 can be created
10 for the purpose of selecting the programs and the order of
11 reproduction. For example, the directory entry 22 can include
12 data which will cause program number 2 to be reproduced first,
13 followed by program number 10 and then program number 4. After
14 creating this custom file 22, if the user then selects the custom
15 file to control reproduction, then the reproduction of program
16 materials will occur with program 2 reproduced first, then
17 program 10, then program 4.

18 As was the case in creation of the highlight scene
19 file, creation of the custom file may be guided by menus and/or
20 prompts and carried out in response to command signals generated
21 using the remote control unit 54. It will be understood that a
22 graphical user interface may also be employed, in which the tree
23 structure of Fig. 13 is displayed by TV receiver 52, together
24 with pull-down menus or the like. In this case, the remote
25 control unit 54 may include a track ball or the like, instead of

1 or in addition to arrow keys, for the purpose of positioning a
2 cursor for selecting menu items, or for selecting graphically
3 represented files for manipulation.

4 There will now be described, with reference to Figs.
5 14-22, a sequence of operations in which materials are recorded
6 on a blank recording medium cartridge while corresponding
7 directory information is stored in the memory carried in the
8 recording medium cartridge.

9 First, referring to Fig. 14, there is shown a
10 diagrammatic representation of the directory for a blank
11 cartridge. As before, a recording medium information branch 15
12 and a recorded content information branch 16 appear under a root
13 item 14. (Although root item 14 is shown for conceptual purposes
14 in Fig. 14, it should be understood that in terms of the actual
15 information stored in the recording medium cartridge memory, the
16 root item 14 may be a "phantom" or nonexistent item.)

17 All of the data making up the recording medium
18 information branch 15 is present in the recording medium
19 cartridge memory, including the common identification information
20 17 and the miscellaneous additional data 18, as previously
21 described, for example, with respect to Fig. 9. However, at this
22 point, since the cartridge is blank, the recorded content
23 information branch 16 consists only of a dummy title level entry
24 in which no identifying information has been recorded.

Fig. 15 illustrates in the form of a flow chart a procedure in which program information is recorded on, and reproduced from, the recording medium of the cartridge, with corresponding storage of information in the memory and reference to previously stored information.

The procedure illustrated in Fig. 15 starts with step S1 in which the cartridge is inserted into a recording and reproducing apparatus (such as the video tape recorder 51 of Fig. 31). Then at step S2, it is determined whether the cartridge is a blank cartridge or whether materials have previously been recorded in the cartridge.

If the cartridge is not blank, then step S3 follows at which information relating to the recorded contents is displayed (for example, on TV receiver 52 of Fig. 31). The procedure then continues by awaiting a command (step S4), which is followed, in a typical case, with the selection of a directory entry (step S5) by means of remote control unit 54 (Fig. 31) or the like.

After a directory entry is selected at step S5, step S6 follows, at which the apparatus advances or rewinds the tape in order to locate the starting point of the program segment associated with the directory entry.

The following step is step S7, at which it is determined whether or not to proceed with a recording operation. If not, step S10 may follow, with actuation of a reproduction button, followed by reproduction (step S11) of the program

1 materials corresponding to the directory entry selected at step
2 S6.

3 Returning to step S2, if it is determined that the tape
4 is blank, the routine again awaits entry of a command (step S8).
5 Actuation of a recording button may follow (step S9), which is
6 also the step which may follow step S7 if it was determined at
7 step S7 to proceed with a recording operation. In either case,
8 upon the commencement of recording in response to step S9, a new
9 directory entry is created (step S12) and the time code
10 representing the point on the tape at which recording has begun
11 is included in the entry (step S13). Recording then continues
12 until a stop or pause is directed by the user (step S14) and at
13 that point a time code representative of the stopping point on
14 the tape is added to the new directory entry (step S15). The
15 routine then ends (step S16).

16 Fig. 16 illustrates the data structure which exists
17 after three program segments, respectively represented by TC1-
18 TC2, TC3-TC4 and TC5-TC6, have been recorded by three iterations
19 of the steps S9-S15. Gathering of these three program segments
20 together into a group will now be described with reference to
21 Figs. 17-19. First, as shown in Fig. 17, a new directory entry
22 23 is created without any identifying information having been
23 applied thereto. Next, a name such as "DRAMA 1" is applied to
24 the newly created directory entry, as shown in Fig. 18. Then, by
25 entry of suitable commands, the three program segments TC1-TC2,

1 TC3-TC4 and TC5-TC6 are subsumed under the directory item "DRAMA
2 1", now indicated by reference numeral 24 in Fig. 19. In other
3 words, the three program segments are associated with the
4 directory entry "DRAMA 1" and are placed at a level below the
5 level of the directory entry "DRAMA 1".

6 At this point, if the user selects the "DRAMA 1" entry
7 and then proceeds to record material, a new directory entry
8 including the recording start point time code TC7 is formed at a
9 level below, and associated with, the "DRAMA 1" entry, as shown
10 in Fig. 20. Several new directory entries produced in this
11 manner may subsequently be gathered together under a new
12 directory entry such as "DRAMA 2", as shown in Fig. 21, in a
13 manner similar to that shown with respect to Figs. 17-19. In the
14 particular example shown in Fig. 21, it will be understood that
15 three program segments are associated with the higher level
16 directory entry "DRAMA 1" (reference numeral 24) while two
17 program segments (TC7-TC8 and TC9-TC10) are associated with the
18 directory entry "DRAMA 2" (reference numeral 26) which is at the
19 same level as the directory entry "DRAMA 1".

20 To complete the directory structure, the heretofore
21 untitled cartridge may be assigned a title such as "POPULAR
22 DRAMA" as shown in Fig. 22.

23 As discussed previously in connection with Fig. 13, the
24 user interface for carrying out the functions illustrated in
25 Figs. 15-22 may include displaying on TV receiver 52 some or all

1 of the tree structures shown in Figs. 16-22, and operating a
2 track ball, "select" key, etc. provided on remote control unit 54
3 for selection of menu items and/or creation of new files or
4 manipulation of existing files. The interface may resemble, for
5 example, that of conventional "desktop" file management and/or
6 drawing/flow-charting software packages. Alternatively, a
7 largely menu-based interface may be provided. In the latter
8 case, menu items such as "CREATE NEW DIRECTORY ENTRY", "APPLY
9 NAME TO DIRECTORY ENTRY", "SELECT PROGRAM", "ASSOCIATE PROGRAM
10 WITH DIRECTORY ENTRY", etc. may be used.

11 It has been noted that the directory structure
12 described above with reference to Figs. 15-22 is for a user tape.
13 The directory provided with a pre-recorded tape will be explained
14 now with reference to Fig. 23. It will be understood that in a
15 pre-recorded tape, normally the entire tape has material recorded
16 continuously thereon from beginning to end. The directory
17 structure for the tape, as shown in Fig. 23, like the user tape
18 directory, includes a root item 14 (which may be phantom item), a
19 cartridge information branch 15 containing information of the
20 type previously described with reference to the corresponding
21 branch in the user tape directory, and a recorded content branch
22 16, which comes fully formed with appropriate directory entries
23 as shown in Fig. 23. More particularly, a cartridge title,
24 typically corresponding to the title of the program material
25 (such as a "MOVIE") recorded therein is present in branch 16,

1 along with two title level directory entries, one of which
2 indicates the body of the material (such as the movie itself) and
3 the other of which indicates additional material such as a
4 "trailer" or other advertising material. The "body" title level
5 entry has associated therewith five chapter level entries each
6 including chapter identifying data and corresponding starting and
7 ending time codes. It will also be noted that associated with
8 the chapter 1 entry are two part level entries, also with
9 corresponding starting and ending time codes. The division of
10 the recorded material into chapters and parts is flexible in the
11 sense that the data stored in the memory can be rewritten so as
12 to designate a different number of chapters and parts and/or
13 different starting and ending points for the chapters and parts.

14 The user is also free to prepare a "digest" of the
15 recorded materials. Referring to Figs. 24 and 25, a directory
16 entry corresponding to a digest (indicated by reference numeral
17 28 on Fig. 25) can be created by selecting representative
18 portions of the recorded materials. In particular, in Fig. 24
19 the portions selected for the digest are shaded, and include
20 portions defined by the pairs of time codes TCA and TCB; TCC and
21 TCD; TCE and TCF; TCG and TCH; and TCI and TCJ. The diagram of
22 Fig. 25 illustrates the data structure at a time when the first
23 three of these segments have been associated with the digest
24 entry 28. It will be noted that the digest entry 28 is at the
25 title level, while the excerpts associated with the digest entry

1 are at the chapter level. Also shown in Fig. 25 are another
2 title level entry with the name "body" indicative of the entire
3 movie, and four chapter level entries associated with the "body"
4 title level entry.

5 After the digest entry has been formed, selection of
6 the digest entry for reproduction causes only the segments
7 represented by the chapter level entries associated with the
8 digest entry to be reproduced, so that, for instance,
9 representative portions lasting, e.g., thirty minutes are viewed
10 instead of an entire movie that may comprise two hours, for
11 example, of recorded material.

12 Formation of the digest entry may be carried out using
13 a menu-based and/or graphical user interface such as has been
14 previously discussed with respect to Figs. 12, 13 and 15-22.

15 There will now be described a data packet used as a
16 format for storing the information in the recording medium
17 cartridge memory. In a preferred embodiment, all of the
18 information stored in the memory, or all information other than
19 image information, is provided in the form of fixed length
20 packets in the format now to be described. As shown in Fig. 26,
21 the data packet is formed of five data bytes of eight bits each.
22 The first byte, PC0, is data which identifies the type of data
23 contained in the balance of the packet. The format of the last
24 four bytes, PC1-PC4, is determined in accordance with the
25 identifying data contained in the first byte. The last four

1 bytes are for storing the actual data to be included in the
2 packet. The first byte, for the identification information, is
3 divided into an upper four bit segment and a lower four bit
4 segment. The upper four bits are a code indicative of which
5 level in the tree structure the data in the packet belongs to,
6 whereas the lower four bits identify, for example, the type of
7 data contained in the last four bytes of the packet. It will be
8 noted that the upper four bits may indicate one of up to 16
9 different levels, while the lower four bits may indicate one of
10 up to 16 different types of data.

11 In particular, with respect to the upper four bits, and
12 referring to Fig. 27, there are shown four different level codes
13 as defined in a preferred embodiment of the invention.

14 Specifically, the code 0001 corresponds to the title level, 0010
15 corresponds to the chapter level, 0011 corresponds to the part
16 level, and 0100 corresponds to the program level. Other codes,
17 of course, can also be defined. Since the first four bits of the
18 first byte indicate the tree level, the level to which the data
19 belongs can be determined simply by reading the first four bits
20 of the first byte of the data packet.

21 There will now be described additional details
22 concerning storage of information in, and retrieval of
23 information from, the recording medium cartridge memory.

24 In particular, Fig. 32 illustrates an alternative
25 manner in which directory entries may be created in connection

1 with recording operations. In the procedure illustrated in Fig.
2 32, a recording operation begins with step S101 at which a
3 recording and reproducing apparatus (such as VTR 51 of Fig. 31)
4 is preprogrammed to carry out a recording operation. The
5 preprogramming is carried out in a conventional manner,
6 including, for example, input of information regarding the
7 program to be recorded such as the starting and ending times of
8 the program and the channel on which the program will be
9 broadcast. Alternatively, a system in which the program is
10 identified by a code may be used, in which case the appropriate
11 code information is input. The procedure continues with step
12 S102, at which the recording and reproducing apparatus determines
13 whether the input starting time has occurred. The recording and
14 reproducing apparatus continues to await the starting time until
15 it occurs, and when the starting time is detected, the apparatus
16 commences recording the program (step S103). The recording
17 continues and at the same time the apparatus awaits the entered
18 ending time (step S104), at which point recording ceases and the
19 operation ends with entry of appropriate starting and ending
20 point data in the cassette memory (step S105). It will be
21 appreciated that the creation of the directory entry may take
22 place beginning with step S103 (i.e., at the commencement of the
23 recording operation), with the ending point being entered on
24 detection of the end time, and termination of recording, in step
25 S105. Each of the starting and the ending time may be provided

1 in the form of a code representing a time code or a frame number,
2 and each code may be stored in a separate data packet of the type
3 described with reference to Figs. 26 and 27. Thus, the two data
4 packets respectively corresponding to the starting point and the
5 ending point together form a basic data item of the type shown in
6 Figs. 1(a) or 1(b).

7 Moreover, step S105 may include the addition of other
8 information to the basic data item, as was described with respect
9 to Figs. 3-5. That information may include text information such
10 as a program name or a date of recording and/or may include image
11 data representing a frame of the recorded material.

12 With respect to text data, the text to be added to the
13 data item may be formed by operating the remote control unit 54
14 (Fig. 31) in response to a text editing display displayed on the
15 TV 52, such as that shown in Fig. 33. Referring to Fig. 33, it
16 will be noted that the text editing display includes a list of
17 alpha-numeric and other characters, as well as function "buttons"
18 and an accumulated text display line used for text editing. The
19 display also has a cursor (indicated by reference numeral 80)
20 which may be repositioned by operating directional keys or the
21 like on the remote control unit. Operation of a "select" key or
22 the like on the remote control unit 54 results in selection of
23 the character or function to which the cursor is pointing.

24 Some or all of the identifying information may also be
25 provided by means of the VBID decoder 70 of the VTR 51 (Fig. 31).

1 In particular, the program name and/or the date may be contained
2 in a code present in the vertical blanking interval of the tuned
3 signal provided by tuner 58. The information may be extracted by
4 VBID decoder 70 and provided to microprocessor 64 for storage as
5 part of the data item in the memory 45.

6 If the additional information to be added to the data
7 item includes an image representative of the recorded material
8 (as in the data item of Fig. 5), the remote control 54 may be
9 operated (by actuating an "INDEX" button for instance) to cause
10 microprocessor 64 to receive (via output processor 62 and frame
11 memory 72) image data representing a frame of a video signal
12 reproduced from the tape 6. Microprocessor 64 then causes the
13 image data to be stored in the memory 45. Alternatively, a frame
14 of image data may be automatically supplied from video signal
15 processor 60 to microprocessor 64 for storage in memory 45 each
16 time recording is initiated.

17 Fig. 34 illustrates a format in which the information
18 stored in the recording medium cartridge memory may be displayed
19 on the TV receiver 52 (Fig. 31) during, for example, step S3 of
20 Fig. 15. Referring to Fig. 34, it will be observed that a header
21 portion of the display includes title information and other
22 information identifying the cartridge as well as the current date
23 and time. The next entry indicates how much recording capacity
24 remains on the recording medium in the cartridge. There follows,
25 in the form of a table, name and date information and other

1 information concerning three programs recorded on the cartridge.
2 There is also a bar chart indicating the relative lengths of the
3 programs and the unrecorded area in the cartridge.

4 Although not shown in Fig. 34, the display may also
5 include a cursor or other indication to permit selection of one
6 of the recorded programs for reproduction, editing, and so forth.

7 Fig. 35 illustrates another format for displaying
8 program index information as, for example, in connection with
9 step S3 of Fig. 15. Referring to Fig. 35, it will be observed
10 that the display is in the form of a split-screen, divided into
11 four quadrants, with the upper left hand, upper right hand and
12 lower left hand quadrants each displaying an image representative
13 of respective program segments that have been recorded on the
14 cartridge. It will be appreciated that this display format may
15 be used when each of the program segments has a corresponding
16 directory entry that includes image data representing a frame of
17 the program segment. Again, although not shown in Fig. 5, a
18 cursor or the like may be used to select for reproduction a
19 program segment represented by the corresponding image frame.

20 According to the method of storing information in a
21 recording medium cartridge memory as described herein, a number
22 of program segments can be grouped together by storing
23 corresponding data items in the memory in the form of a tree
24 structure. This data structure facilitates retrieval of the
25 information stored in the memory and also facilitates access to

1 the program materials recorded on the recording medium. The
2 information stored in the memory also preferably includes data
3 relating to the recording medium, the manufacturer of the
4 cartridge, and so forth.

5 The data structure described herein also makes it
6 possible to provide options for the user of the cartridge,
7 including creation of additional data items and adding of
8 identifying information and the like to existing data items to
9 aid in the management of the recording medium cartridge and the
10 materials recorded therein.

11 It will also be noted that the information stored in
12 the cartridge memory can be conveniently displayed in the form of
13 a table or list, or if image data is stored in the memory, images
14 representative of the recorded materials can be conveniently
15 displayed. Further, the data structure facilitates
16 classification of the various types of recorded materials, so
17 that operation of the recording and reproducing apparatus and
18 management of the recorded materials is made easier.

19 Although the invention has been described largely in
20 terms of recording of video signals, it should be understood that
21 the invention can also be advantageously applied to music and
22 other types of audio recordings, as well as recording of other
23 types of materials. It should also be understood that the
24 invention may be applied with respect to other types of recording

1 media in addition to video tape cassettes and may be applied in
2 other types of apparatus in addition to video tape recorders.

3 Having described specific preferred embodiments of the
4 present invention with reference to the accompanying drawings, it
5 is to be understood that the invention is not limited to those
6 precise embodiments, and that various changes and modifications
7 may be effected therein by one skilled in the art without
8 departing from the scope or spirit of the invention as defined in
9 the appended claims.

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WHAT IS CLAIMED IS:

1. A method of storing information representative of signals recorded on a recording medium accommodated within a recording medium cartridge, comprising the steps of:

providing a memory device as part of said recording medium cartridge; and

storing said information in the form of a tree structure comprising at least a plurality of directory entries each having associated therewith a plurality of data items, each said data item representing a respective portion of said signals recorded on said recording medium and containing data indicative of a starting position and an ending position on said recording medium of said respective portion of said signals.

2. A method according to claim 1; wherein said recording medium is a magnetic tape.

3. A method according to claim 1; wherein said recorded signals include video signals.

4. A method according to claim 1; further comprising the step of adding supplementary data to at least some of said data items in addition to said data indicative of said starting and ending positions.

5. A method according to claim 4; wherein said supplementary data includes text data for identifying said respective portion of said signals.

1 6. A method according to claim 5; wherein said step
2 of adding said supplementary data includes loading said recording
3 medium cartridge in a recording and reproducing apparatus and
4 entering said text data by means of a remote control device for
5 controlling said recording and reproducing apparatus.

6 7. A method according to claim 4; wherein said
7 supplementary data includes image data for identifying said
8 respective portion of said signals.

9 8. A method according to claim 1; wherein at least
10 some of said data items are formed of at least one data packet,
11 each said data packet having a fixed length and a predetermined
12 format.

13 9. A method according to claim 8; wherein each said
14 data packet includes a level code indicative of a level of said
15 tree structure, said data packet being assigned to said level of
16 said tree structure.

17 10. A method according to claim 9; wherein each said
18 data packet includes a plurality of data bytes, said level code
19 being included in a first one of said data bytes.

20 11. A method according to claim 10; wherein each said
21 data packet is formed of five data bytes.

22 12. A method of retrieving information representative
23 of signals recorded on a recording medium accommodated within a
24 recording medium cartridge, said information having been stored
25 in the form of a tree structure in a memory device provided as

part of said recording medium cartridge, the method comprising
the steps of:

loading said recording medium cartridge in a recording
and reproducing apparatus that is operatively connected to a
display device; and

displaying at least some of said information on said
display device.

13. A method according to claim 12; wherein said
displaying step includes displaying at least some of said
information in the form of a table.

14. A method according to claim 12; wherein said
displaying step includes displaying at least some of said
information in the form of a list.

15. A method according to claim 12; wherein said
signals recorded on said recording medium comprise video signals.

16. A method according to claim 15; wherein said
display device is selected from the group consisting of a video
monitor and a television receiver.

17. A method according to claim 16; wherein said
information stored in said memory device includes image data
representative of respective portions of said recorded video
signals, and said displaying step includes displaying at least
one image representative of a respective portion of said recorded
video signals.

1 18. A method according to claim 17; wherein said
2 displaying step includes displaying a plurality of images
3 simultaneously in split-screen form, each of said displayed
4 images representing a respective portion of said recorded video
5 signals.

6 19. A method according to claim 18; further comprising
7 the steps of:

8 selecting one of said simultaneously displayed images;
9 and

10 reproducing the respective portion of said recorded
11 video signals represented by said selected one of said
12 simultaneously displayed images.

13 20. A method according to claim 12; wherein said
14 displayed information includes a plurality of items each
15 representing a respective portion of said signals recorded on
16 said recording medium; and further comprising the steps of:

17 selecting one of said items of said displayed
18 information; and

19 reproducing the respective portion of said recorded
20 signals represented by said selected one of said items.

21 21. A recording medium cartridge for use with a
22 reproducing apparatus, comprising:

23 a housing;

24 a recording medium accommodated within said housing;

25 a memory device carried by said housing; and

1 terminals associated with at least one outer surface of
2 said housing for providing electrical connections between said
3 memory device and said reproducing apparatus;

4 said memory device having stored therein data signals
5 representative of program information recorded on said recording
6 medium, said data signals being stored in the form of a tree
7 structure comprising at least a plurality of directory entries
8 each having associated therewith a plurality of data items, each
9 said data item representing a respective portion of said program
10 information and containing data indicative of a starting position
11 and an ending position on said recording medium of said
12 respective portion of said program information.

13 22. A recording medium cartridge according to claim
14 21; wherein said recording medium is a magnetic tape.

15 23. A recording medium cartridge according to claim
16 21; wherein at least some of said data items are formed of at
17 least one data packet, each said data packet having a fixed
18 length and a predetermined format.

19 24. A recording medium cartridge according to claim
20 23; wherein each said data packet includes a level code
21 indicative of a level of said tree structure, said data packet
22 being assigned to said level of said tree structure.

23 25. A recording medium cartridge according to claim
24 24; wherein each said data packet includes a plurality of data

1 bytes, said level code being included in a first one of said data
2 bytes.

3 26. A recording medium cartridge according to claim
4 25; wherein each said data packet is formed of five data bytes.

5 27. A recording medium cartridge according to claim
6 21; wherein said memory device comprises an integrated circuit
7 device.

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ABSTRACT OF THE DISCLOSURE

1
2 A recording medium cartridge includes a memory circuit
3 for storing information concerning signals recorded on the
4 recording medium within the cartridge. The information is stored
5 in the memory circuit in the form of a hierarchic data structure
6 which includes a plurality of data packets having a predetermined
7 form and length. Each data packet includes a code indicative of
8 a level in the data structure to which the data packet belongs.
9 At least some of the data packets include data indicative of
10 starting and ending positions on the recording medium of recorded
11 signals which the data packet represents. The hierarchic (or
12 "tree") data structure facilitates rapid retrieval and
13 reproduction of the signals recorded on the recording medium,
14 particularly when the recording medium is a magnetic tape. The
15 tree structure also facilitates storage of information in
16 connection with recording of additional signals on the recording
17 medium.

FIG. 1(a)

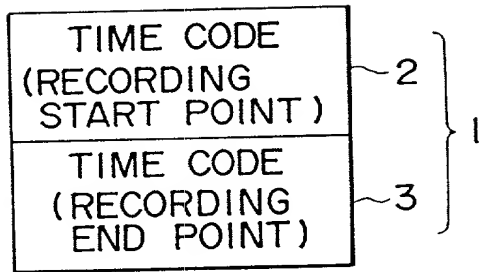


FIG. 1(b)

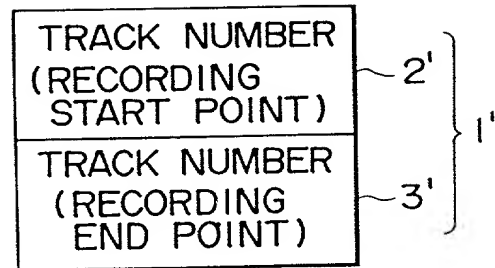


FIG. 2

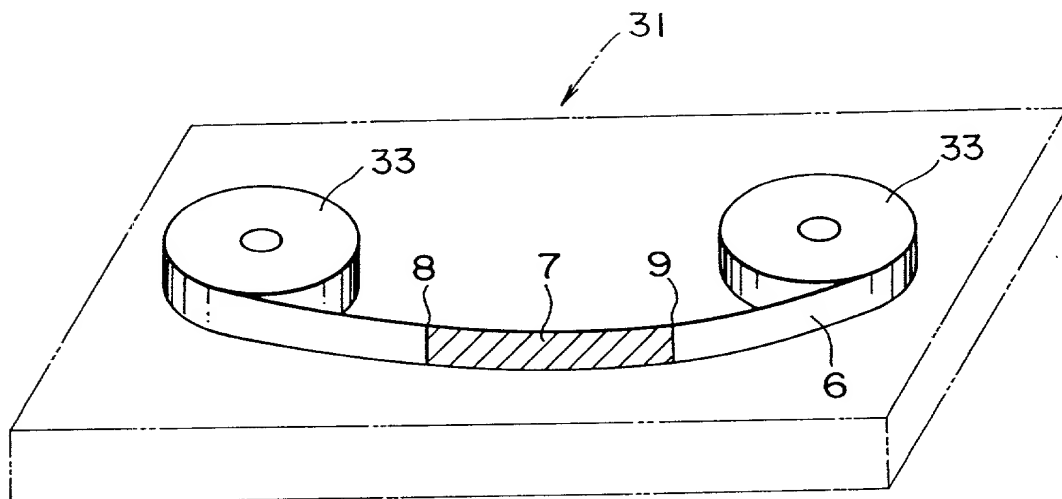


FIG. 6

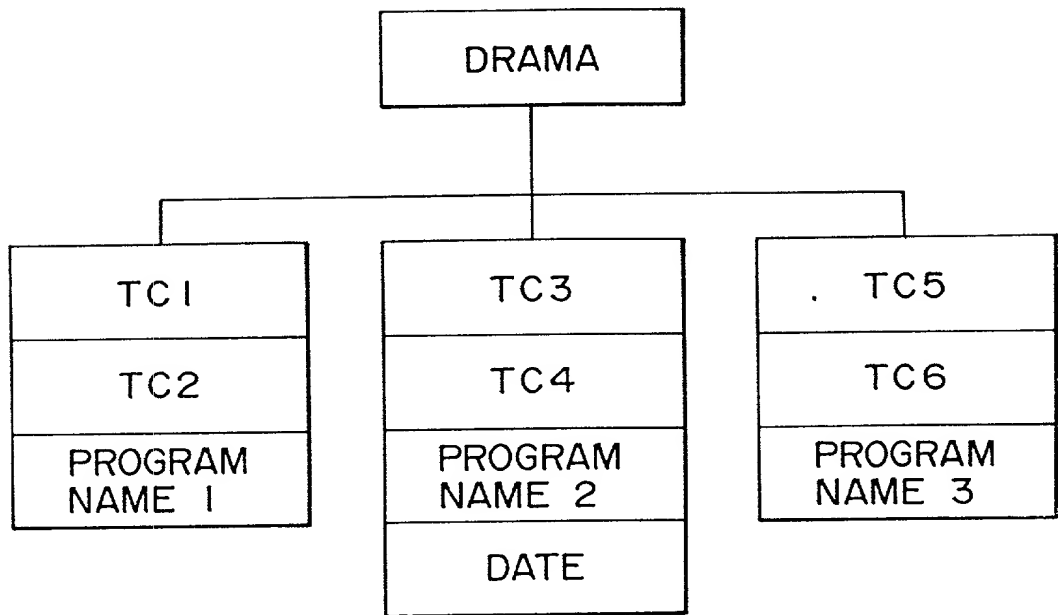
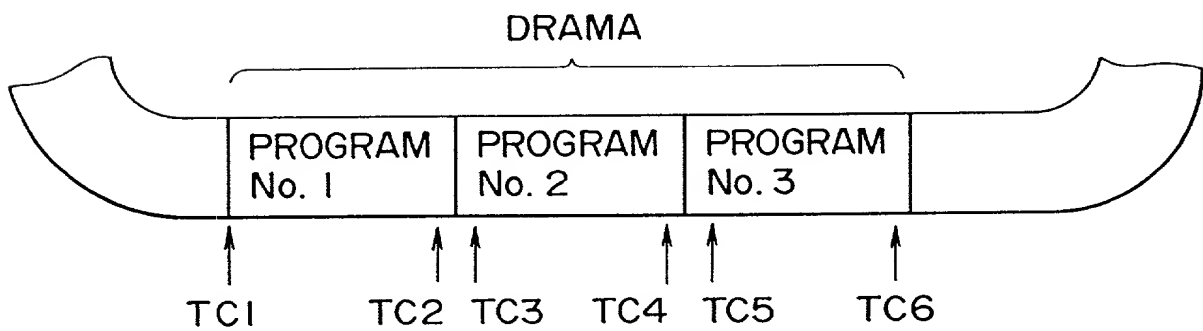


FIG. 7



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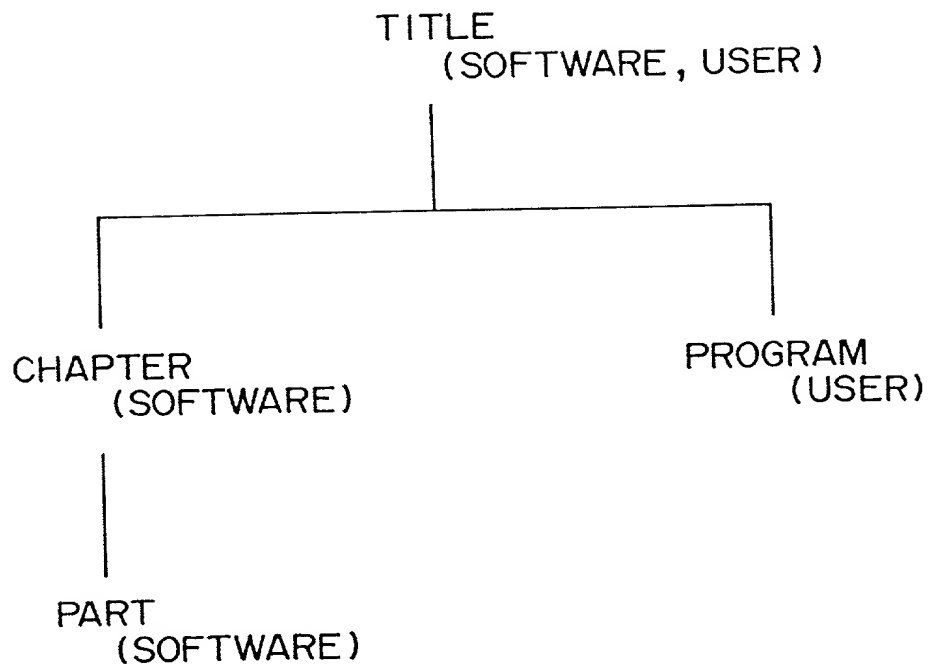
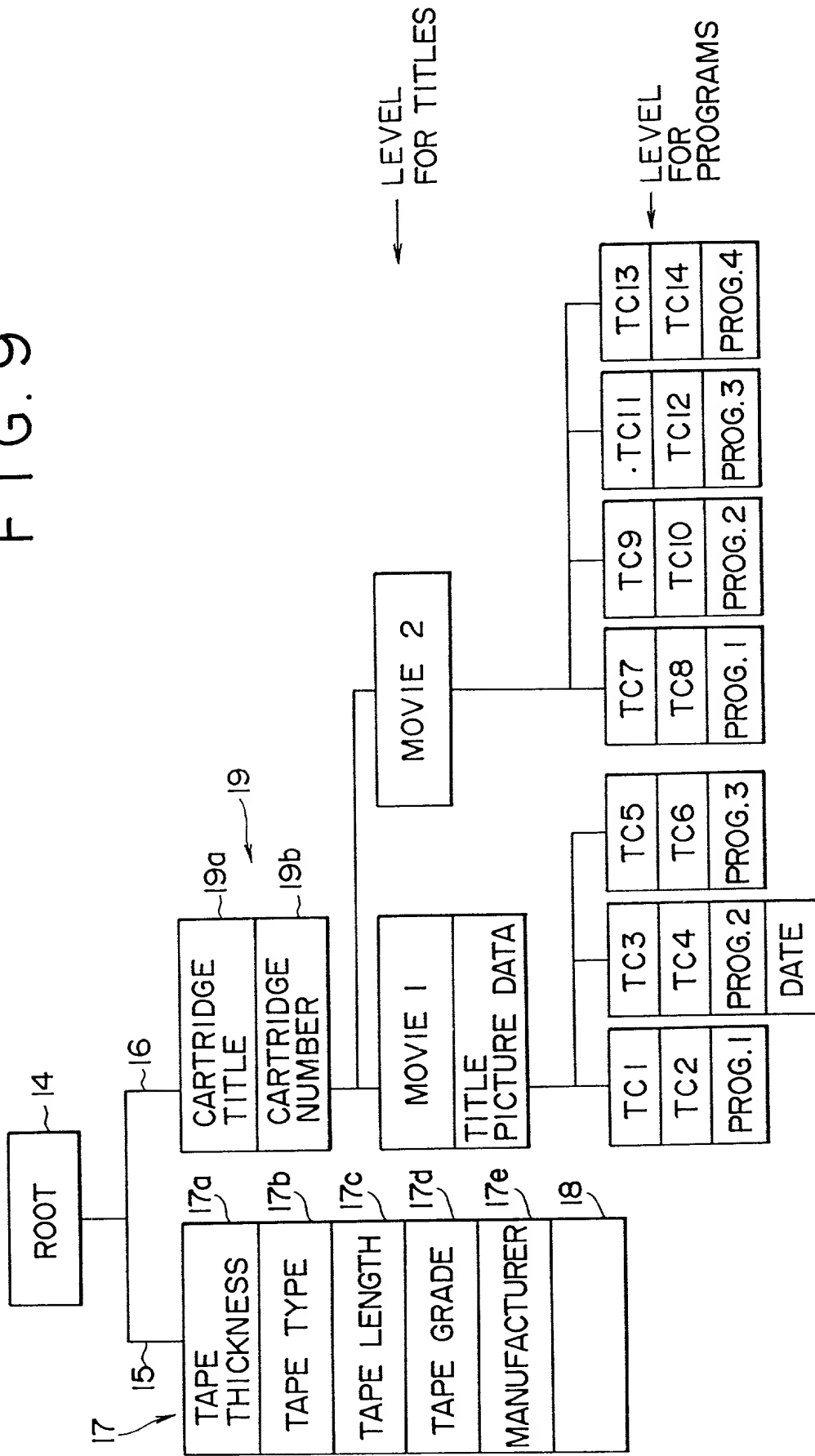


FIG. 9



MEMORY ADDRESS
↓

TAPE THICKNESS
TAPE TYPE
TAPE LENGTH
TAPE GRADE
MANUFACTURER
:
:
CASSETTE TITLE
CASSETTE NUMBER
MOVIE 1
TITLE PICTURE DATA
TC 1
TC 2
PROG. 1
TC 3
TC 4
PROG. 2
DATE
:
:
MOVIE 2
TC 7
TC 8
PROG. 1
TC 9
:
:

COMMON
IDENTIFICATION
INFORMATION

ARBITRARY
DATA

TITLE
LEVEL

PROGRAM
LEVEL

TITLE
LEVEL

PROGRAM
LEVEL

RECORDING
MEDIUM
INFORMATION

RECORDED
CONTENT
INFORMATION

FIG. 10

FIG. 11

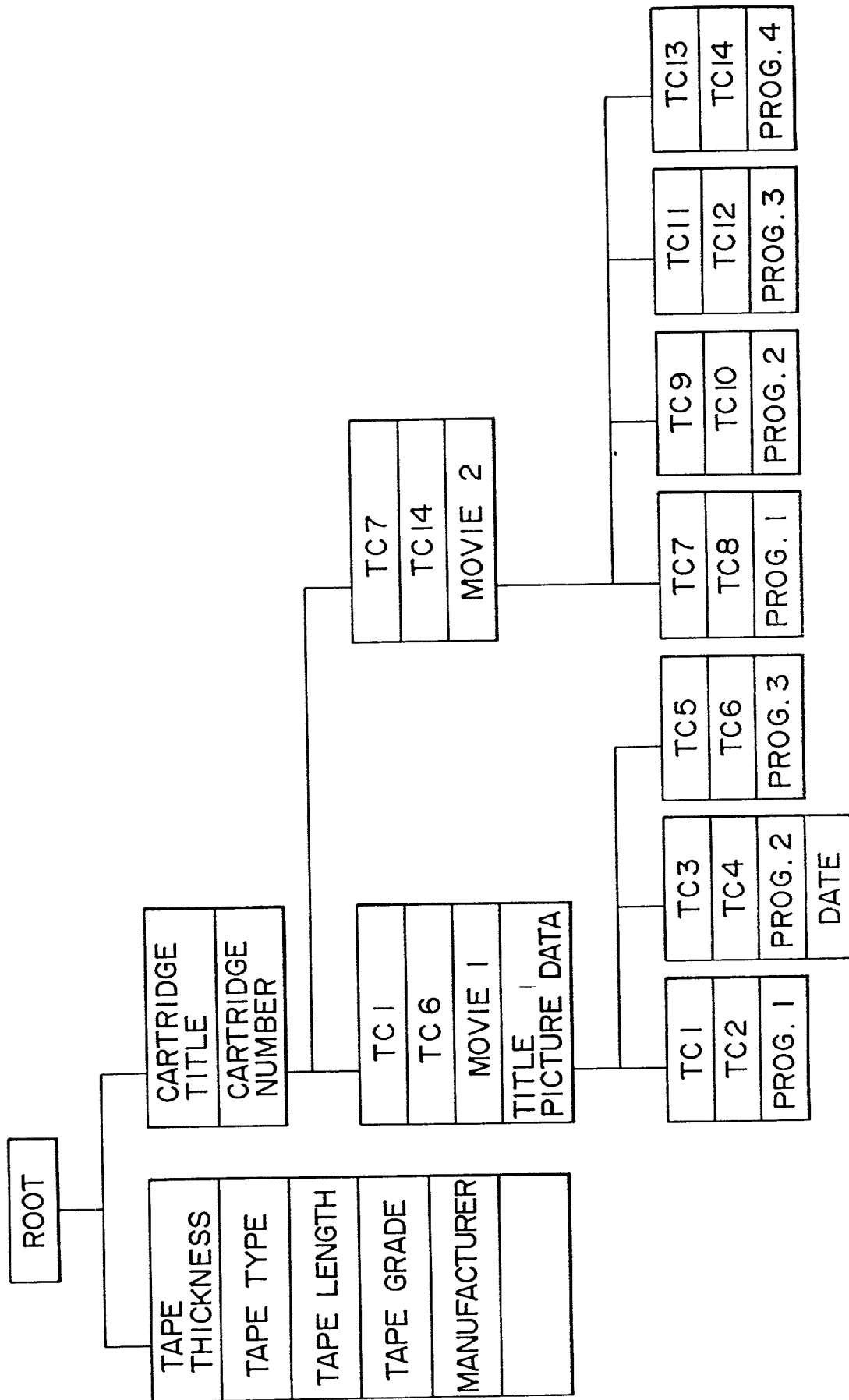


FIG. 12

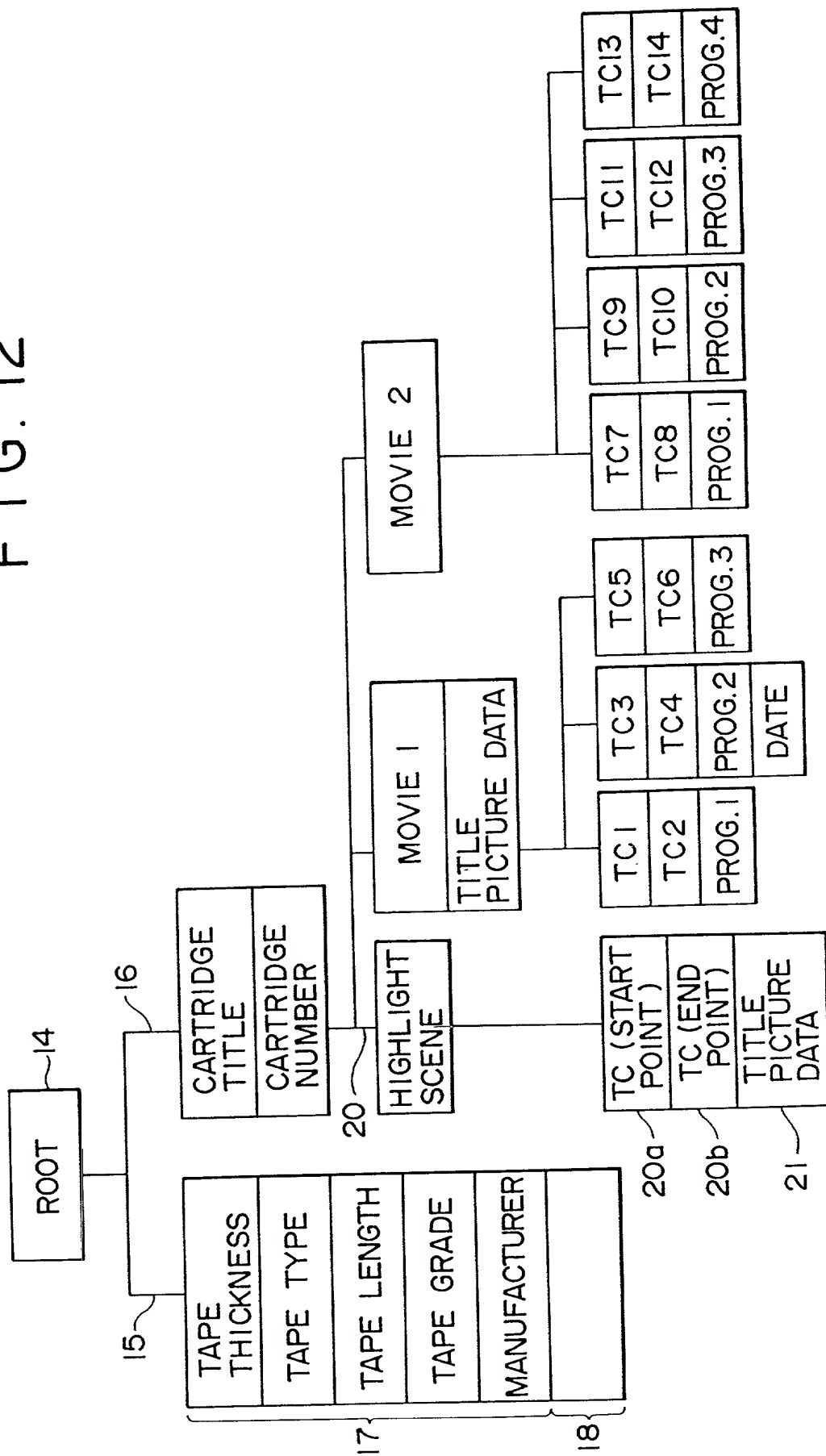


FIG. 13

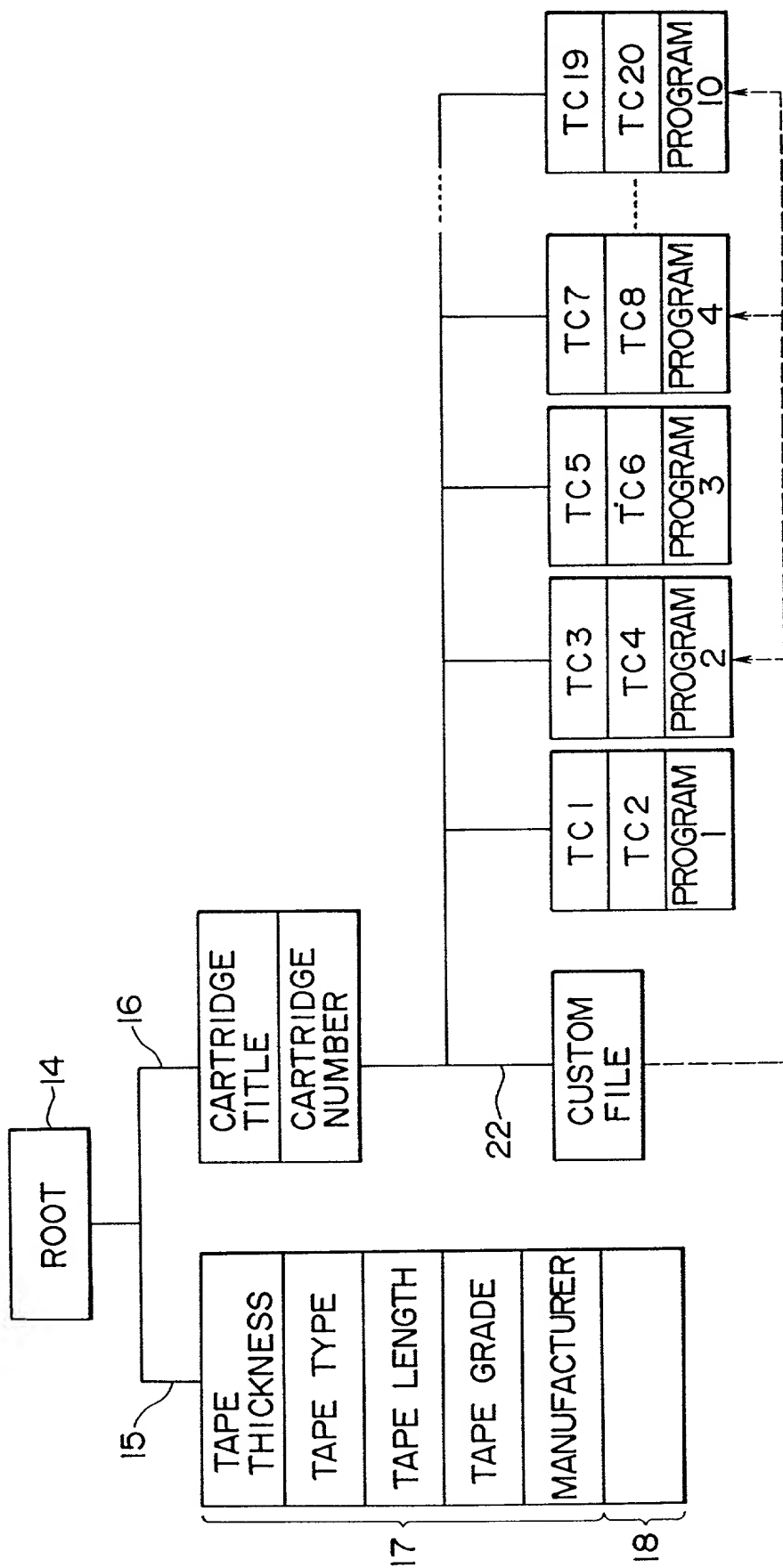


FIG. 14

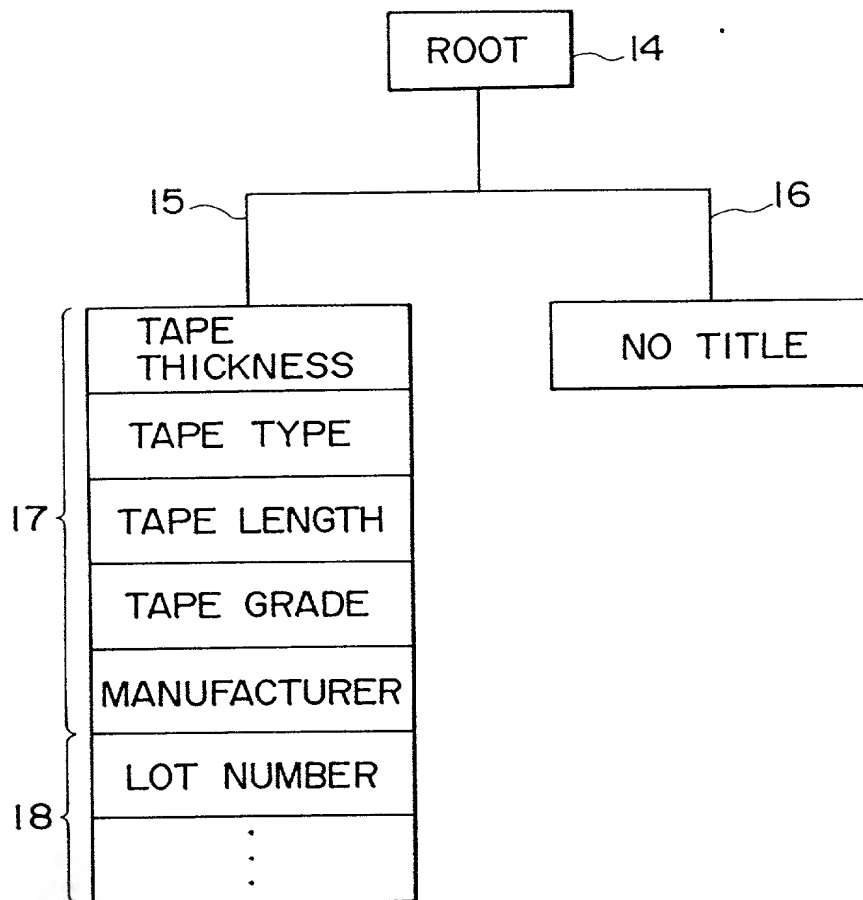
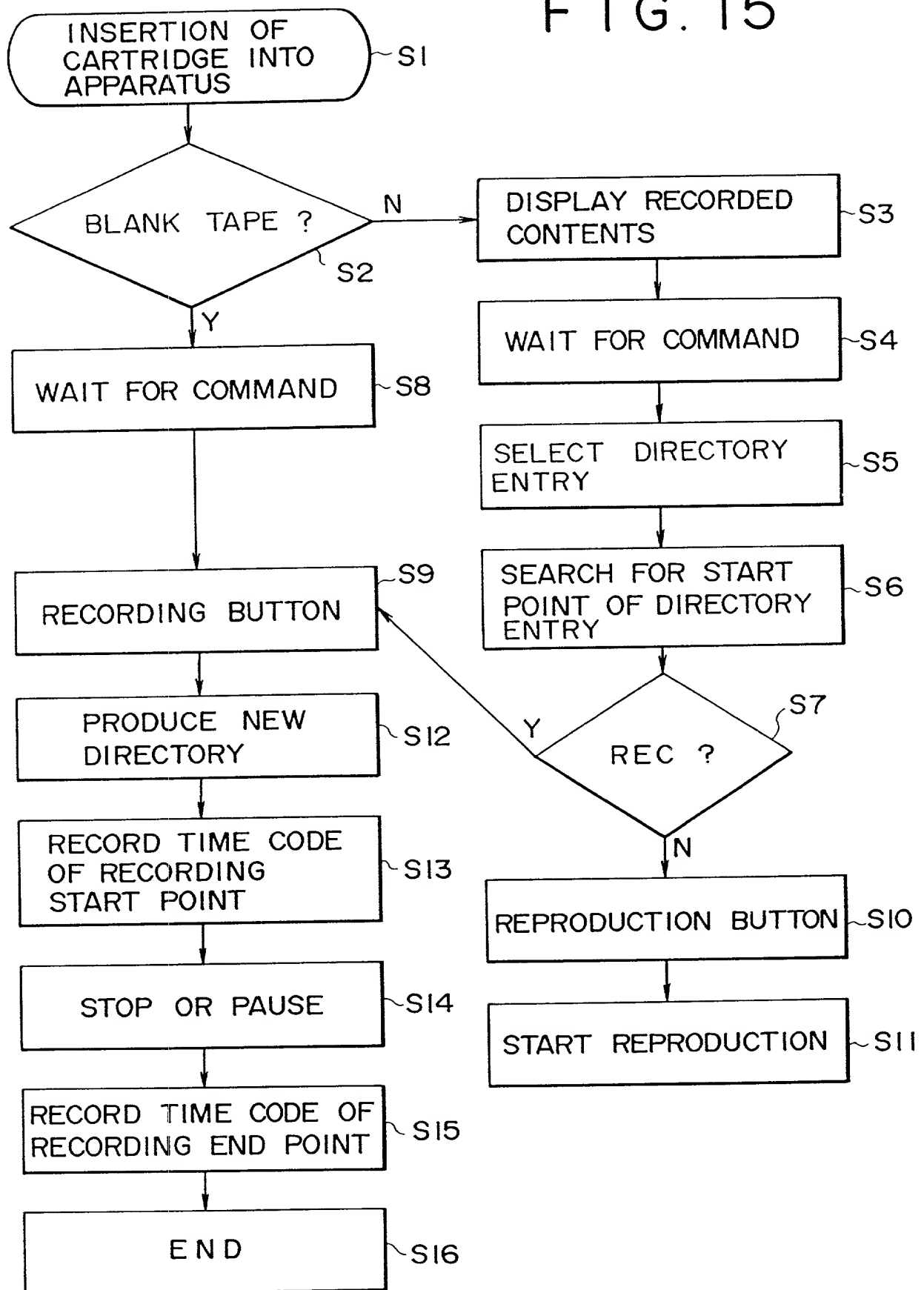


FIG. 15



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FIG. 16

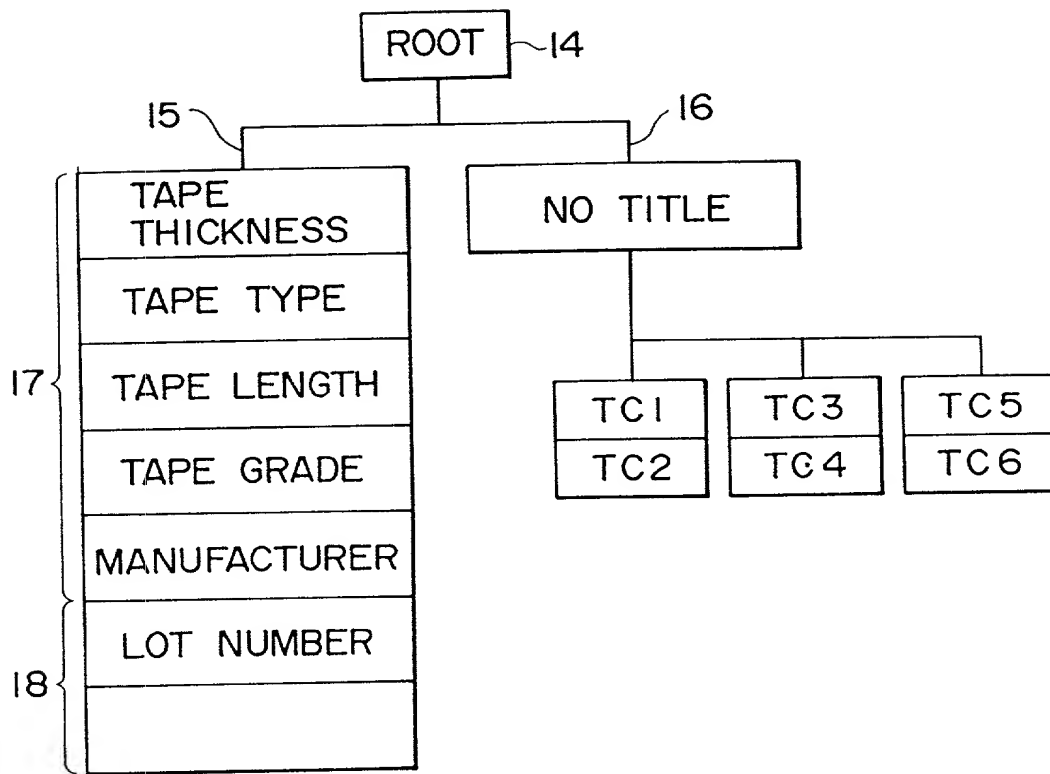


FIG. 17

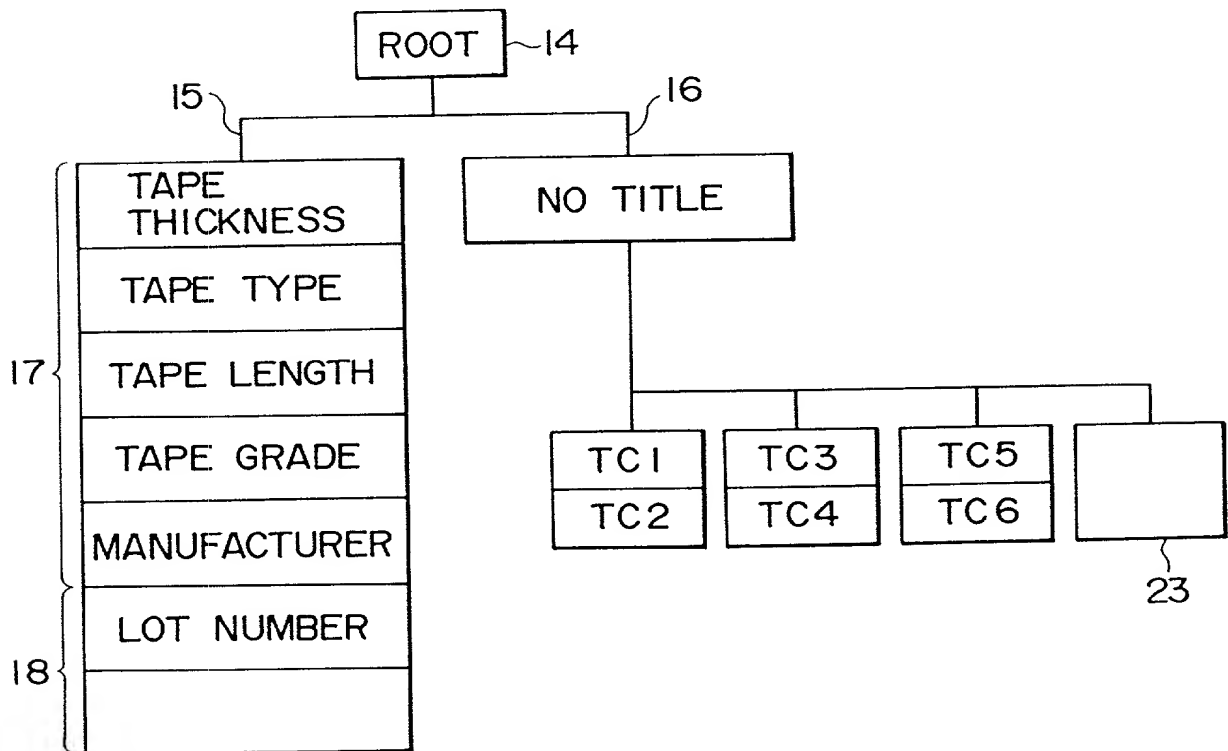


FIG. 18

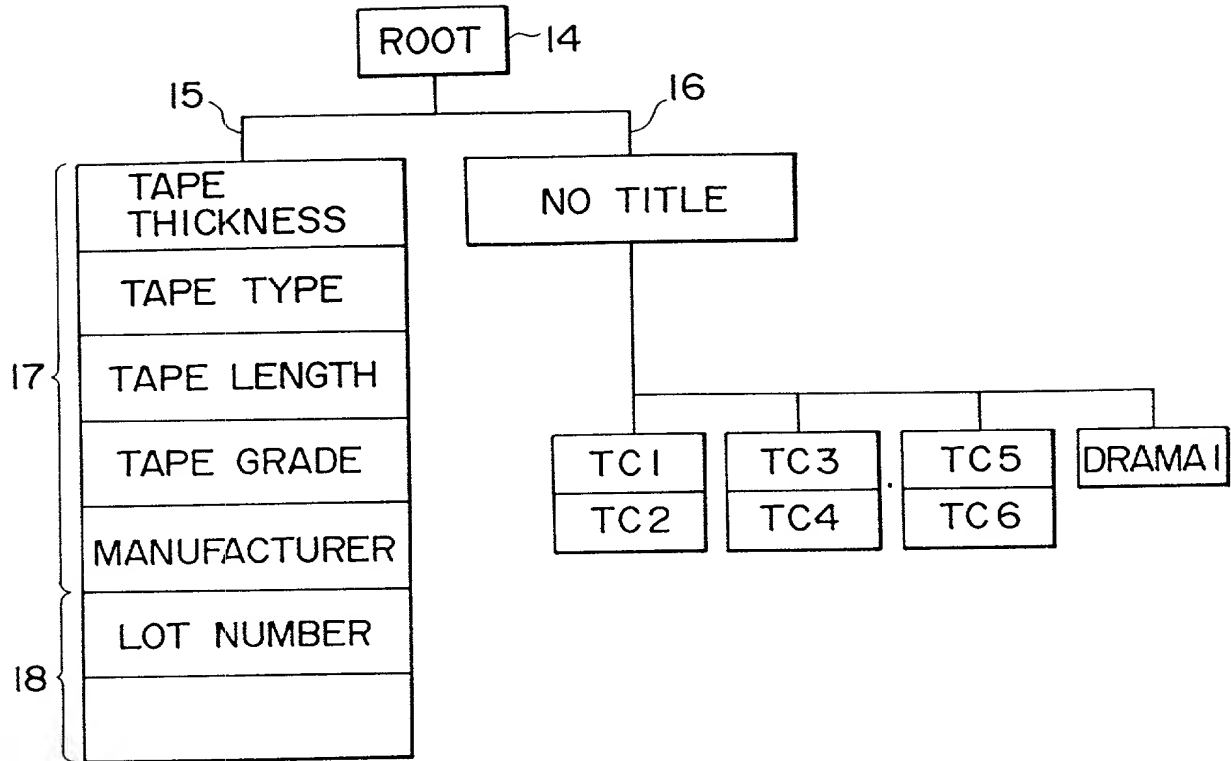


FIG. 19

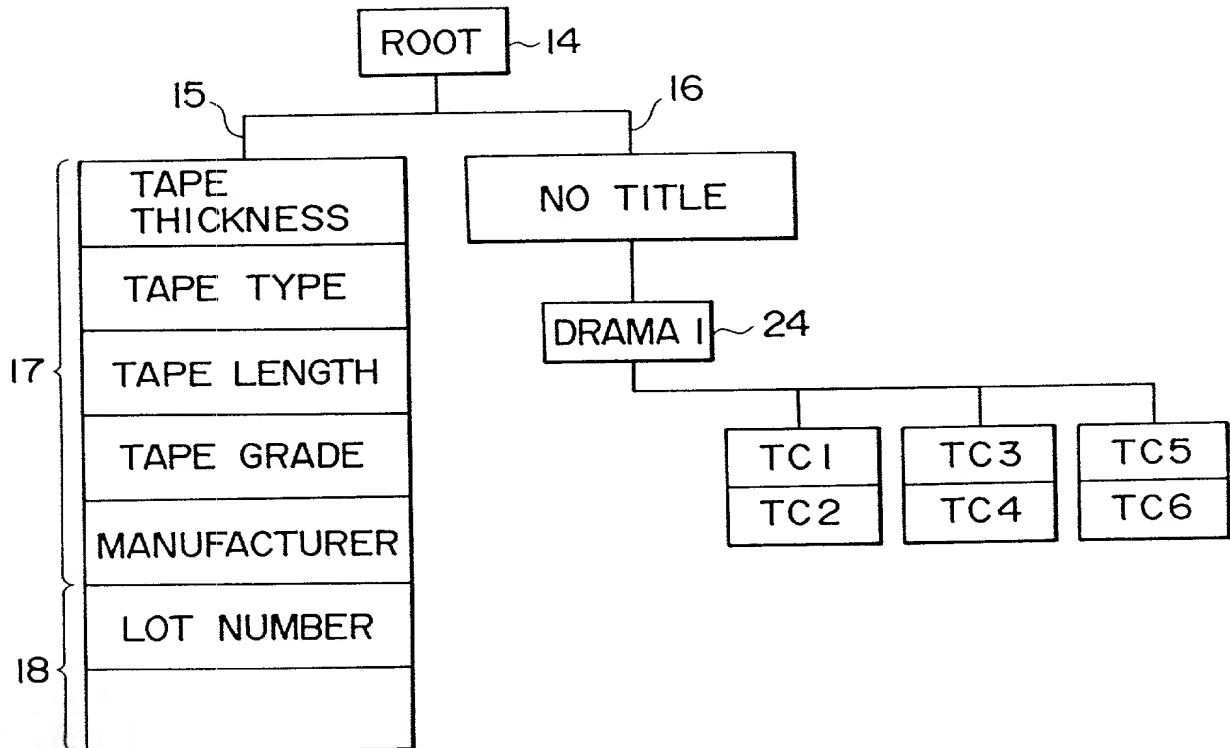


FIG. 20

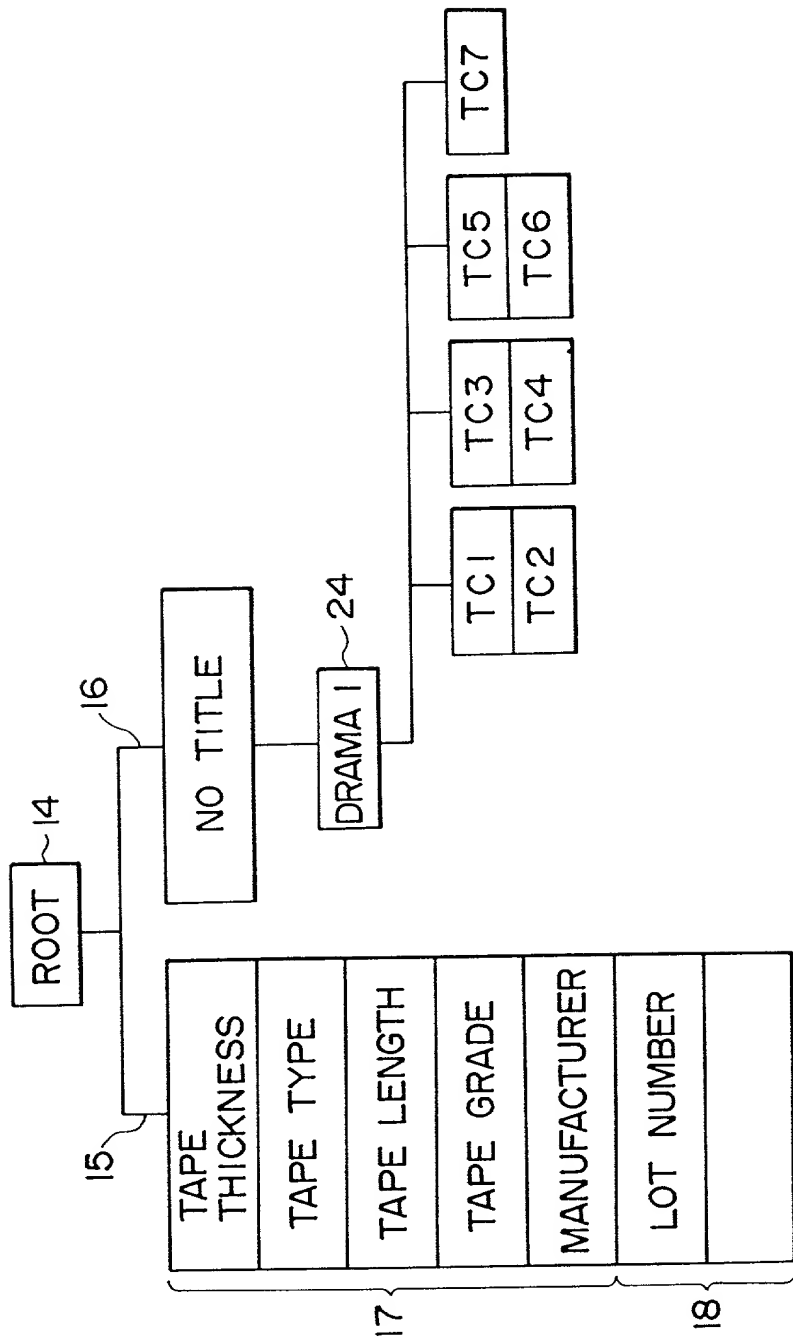


FIG. 21

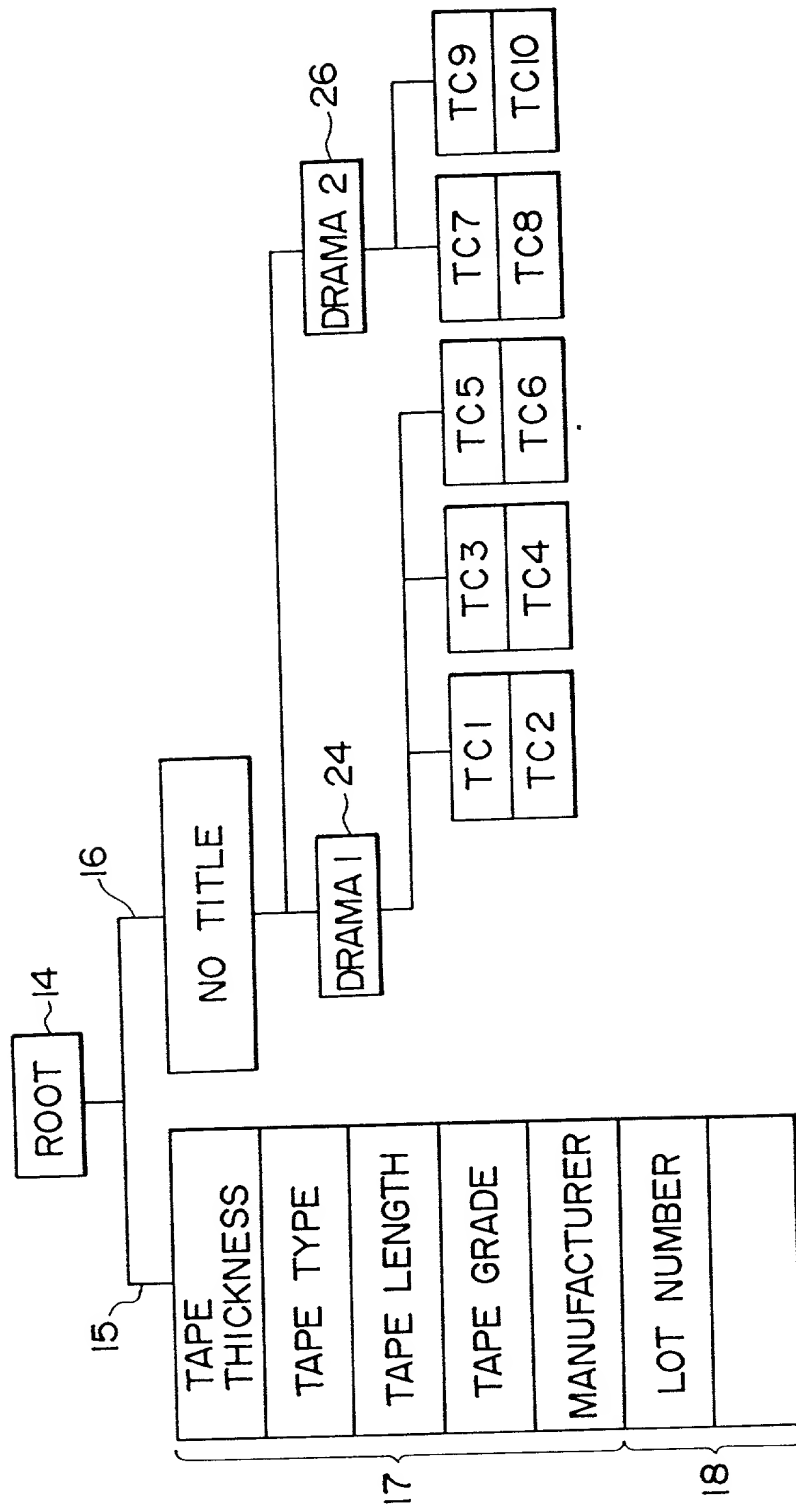


FIG. 22

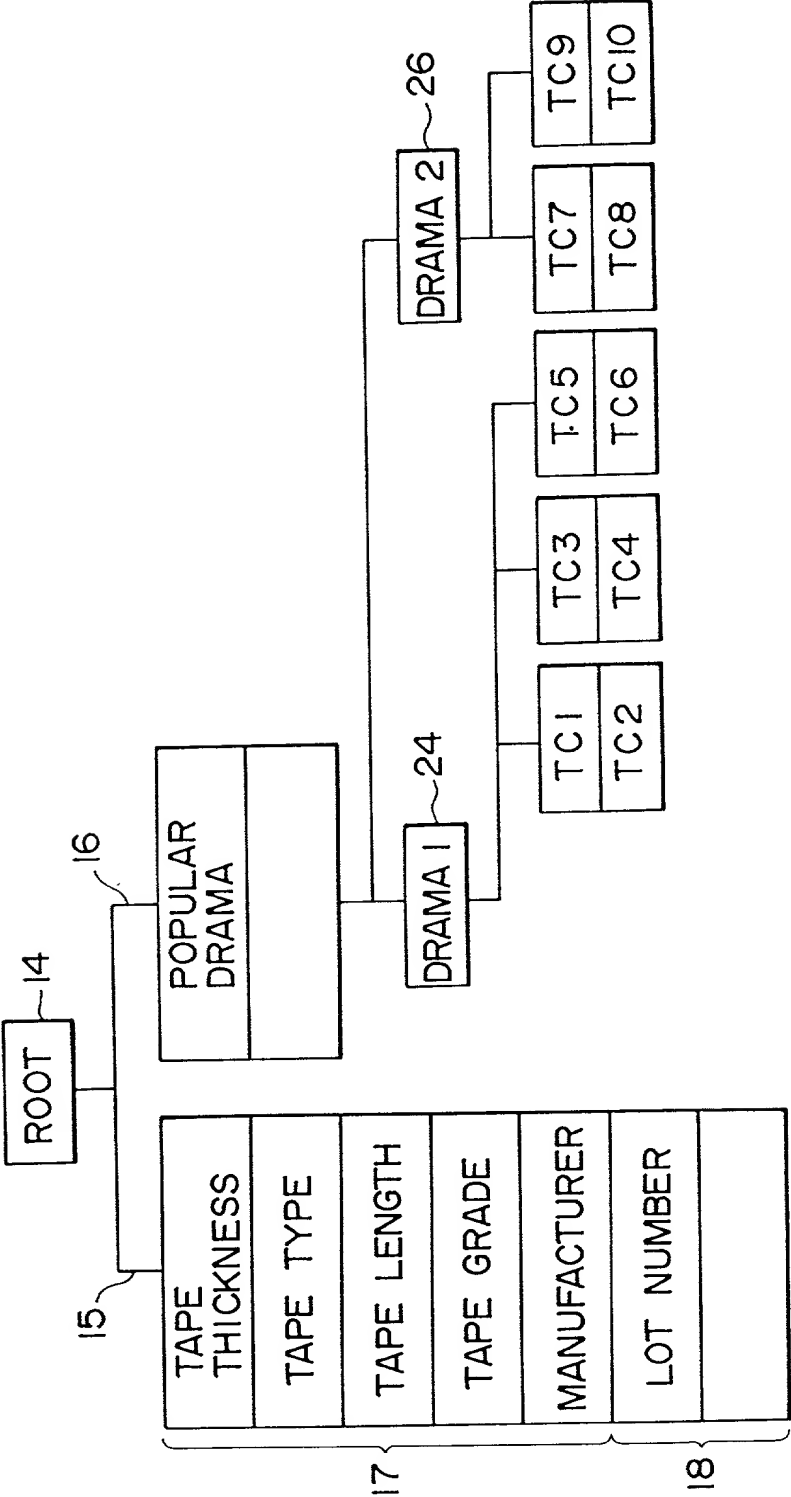


FIG. 23

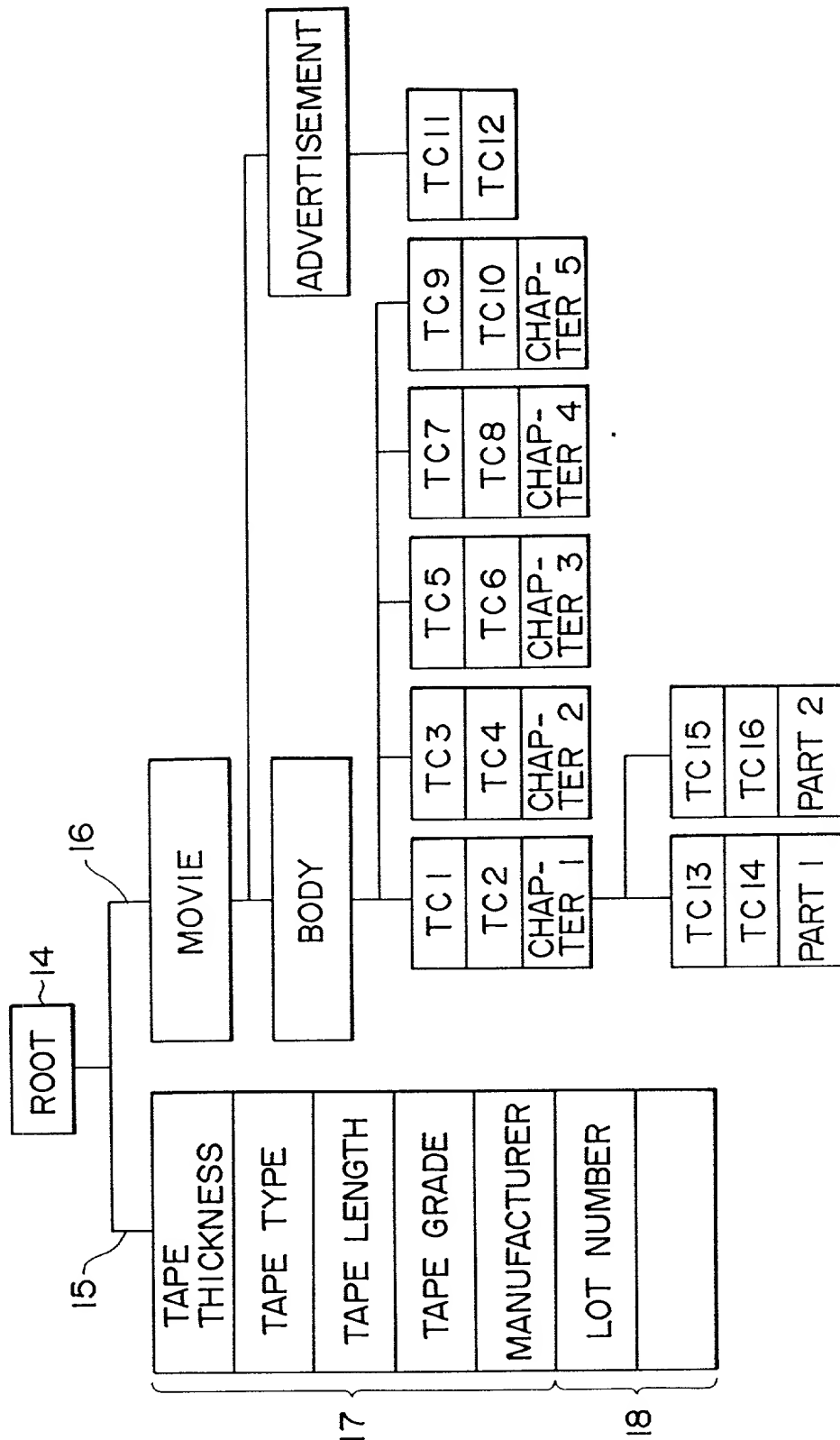


FIG. 24

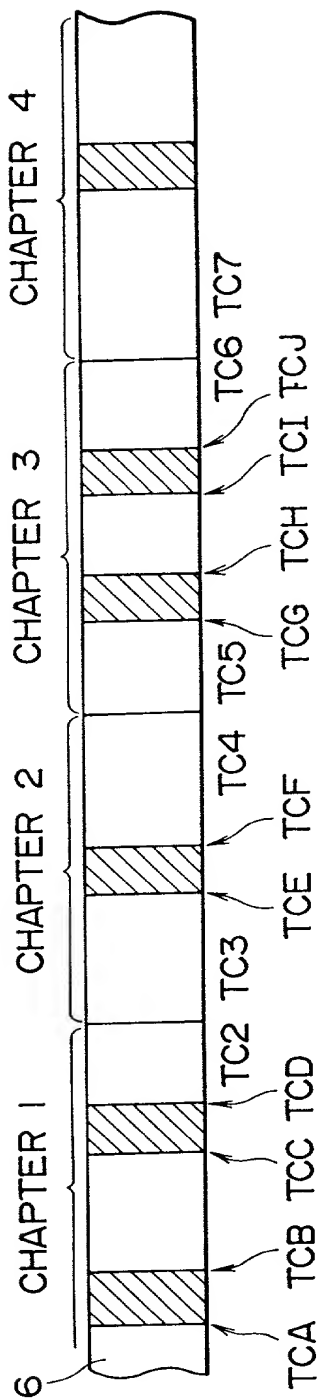


FIG. 25

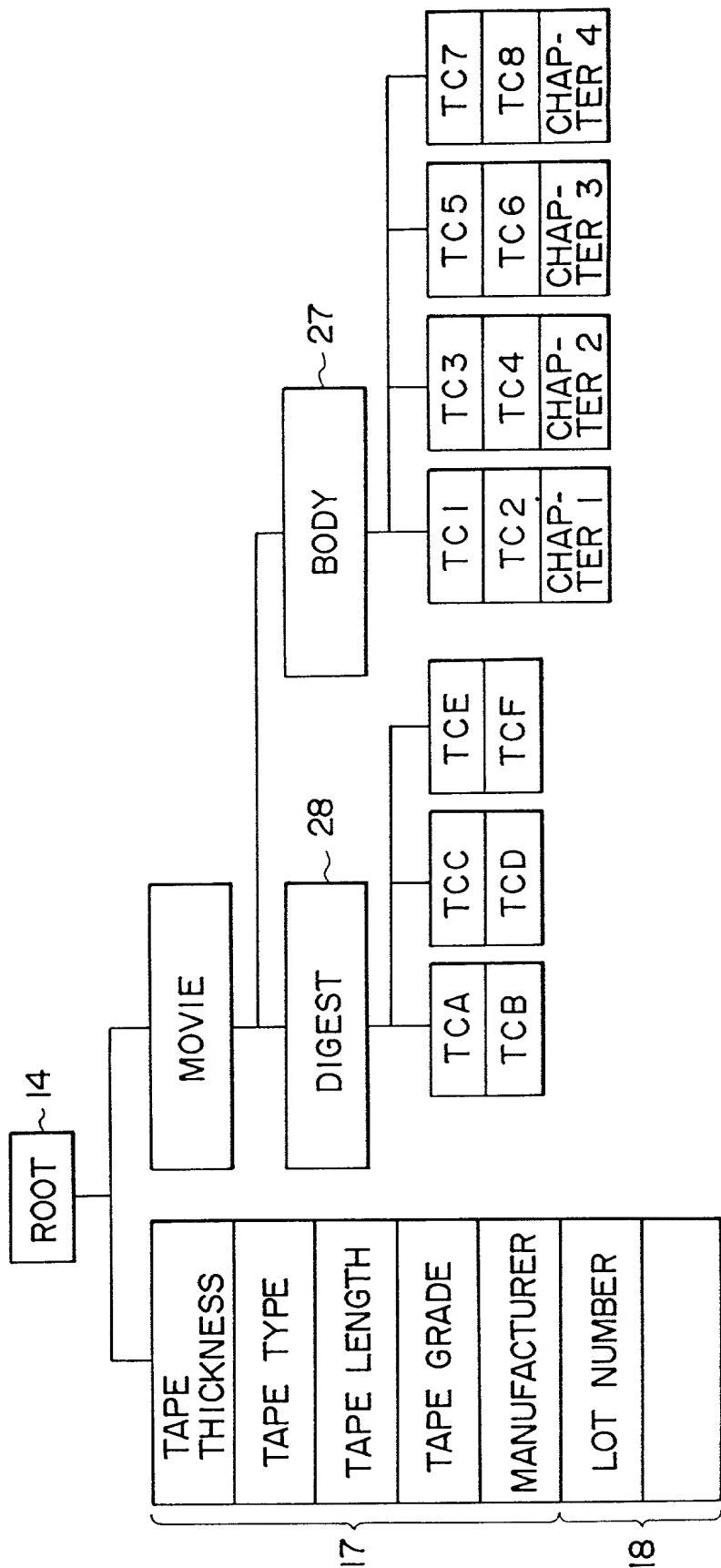


FIG. 26

PACK

		MSB				LSB			
PC0	(ITEM)								
PC1	(DATA)								
PC2									
PC3									
PC4									

FIG. 27

MSB	ITEM	LSB	LEVEL
UPPER		LOWER	
0001	XXXX	XXXX	TITLE
0010	XXXX	XXXX	CHAPTER
0011	XXXX	XXXX	PART
0100	XXXX	XXXX	PROGRAM

XXXXX: 0000 1111

FIG. 28

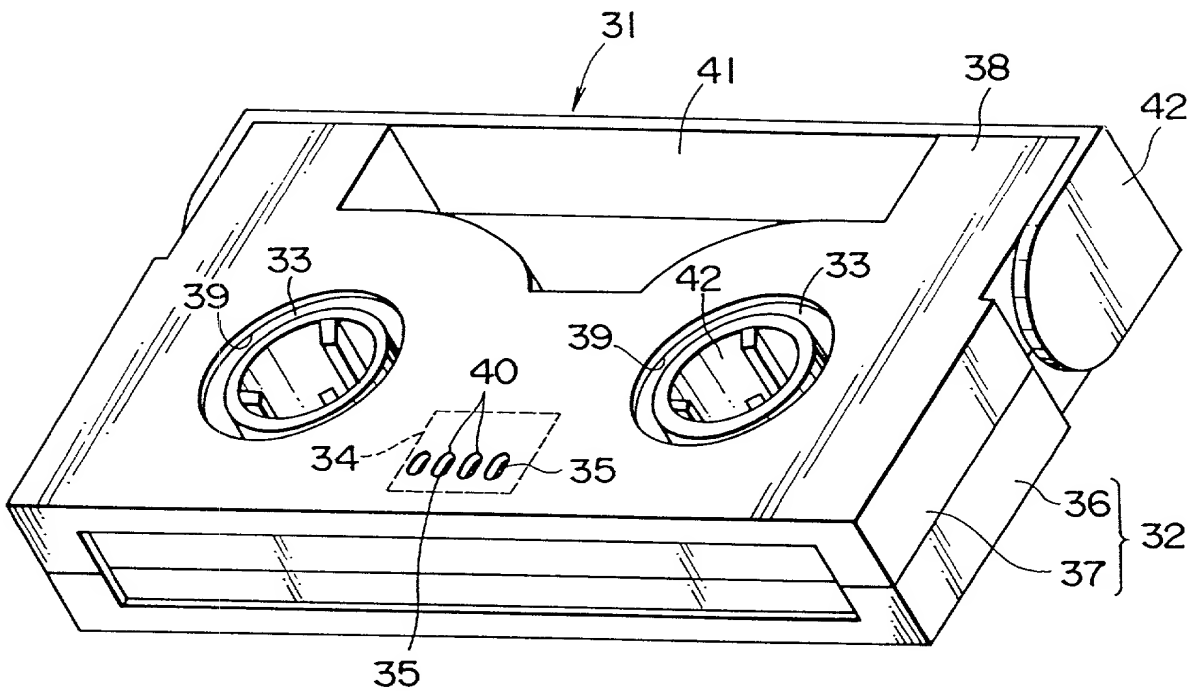


FIG. 29

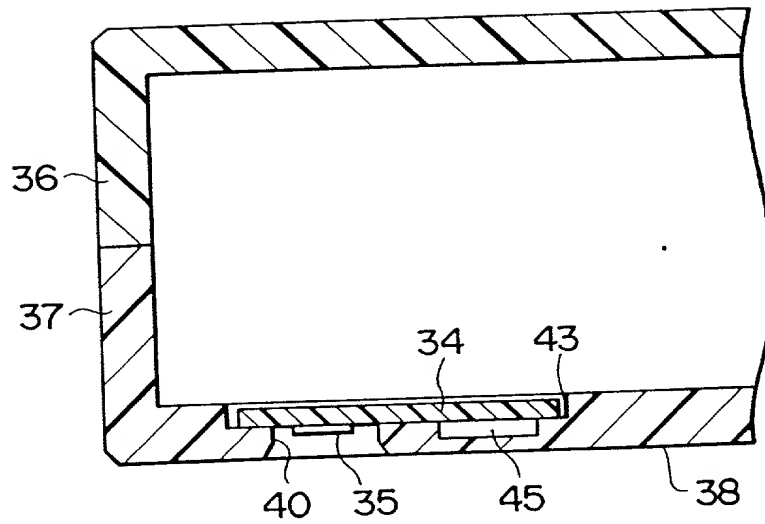


FIG. 30

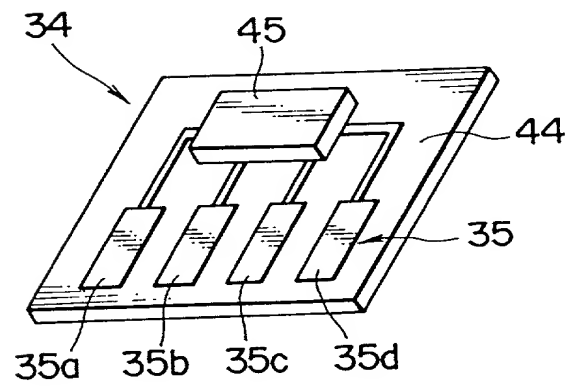


FIG. 31

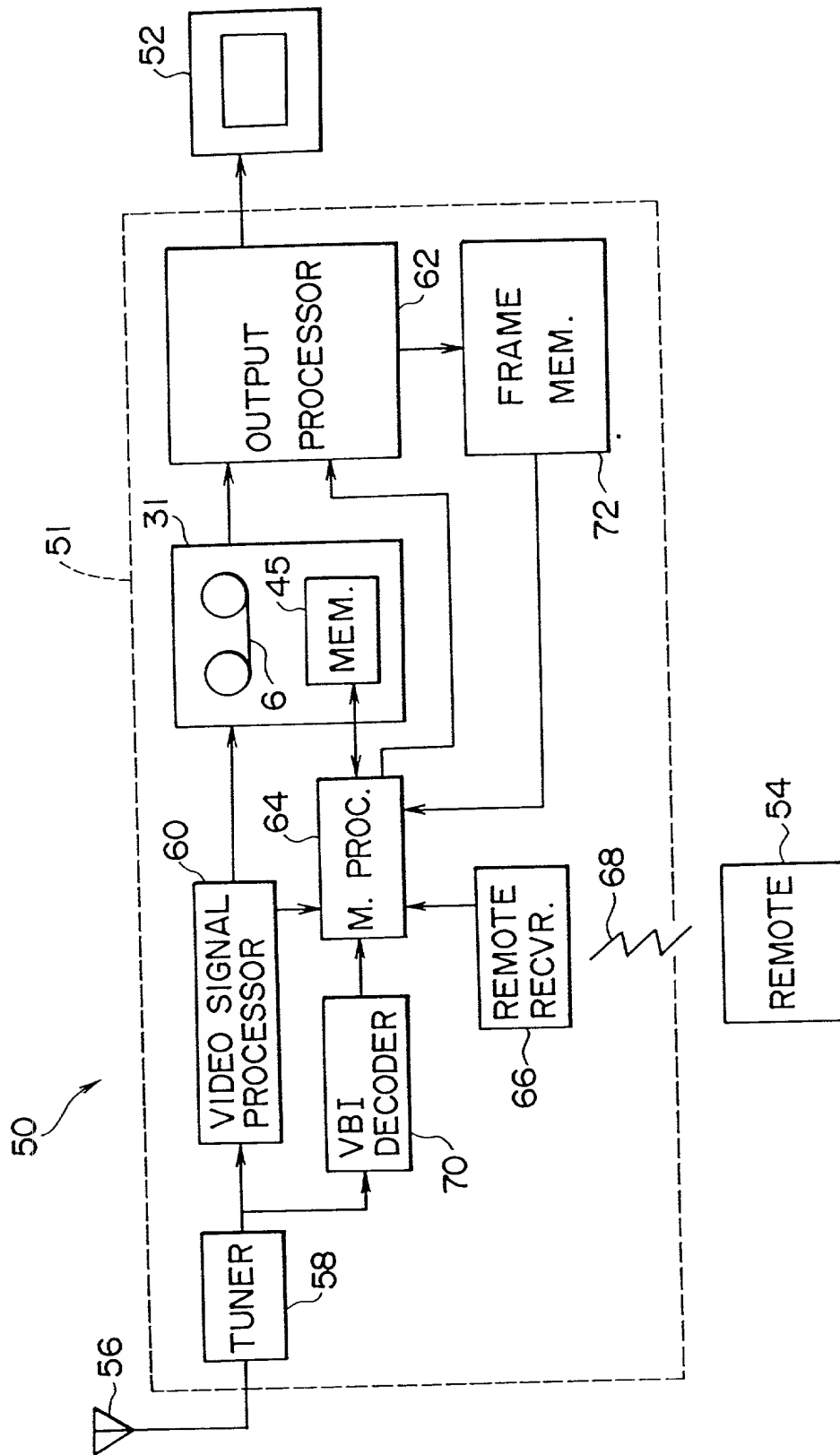
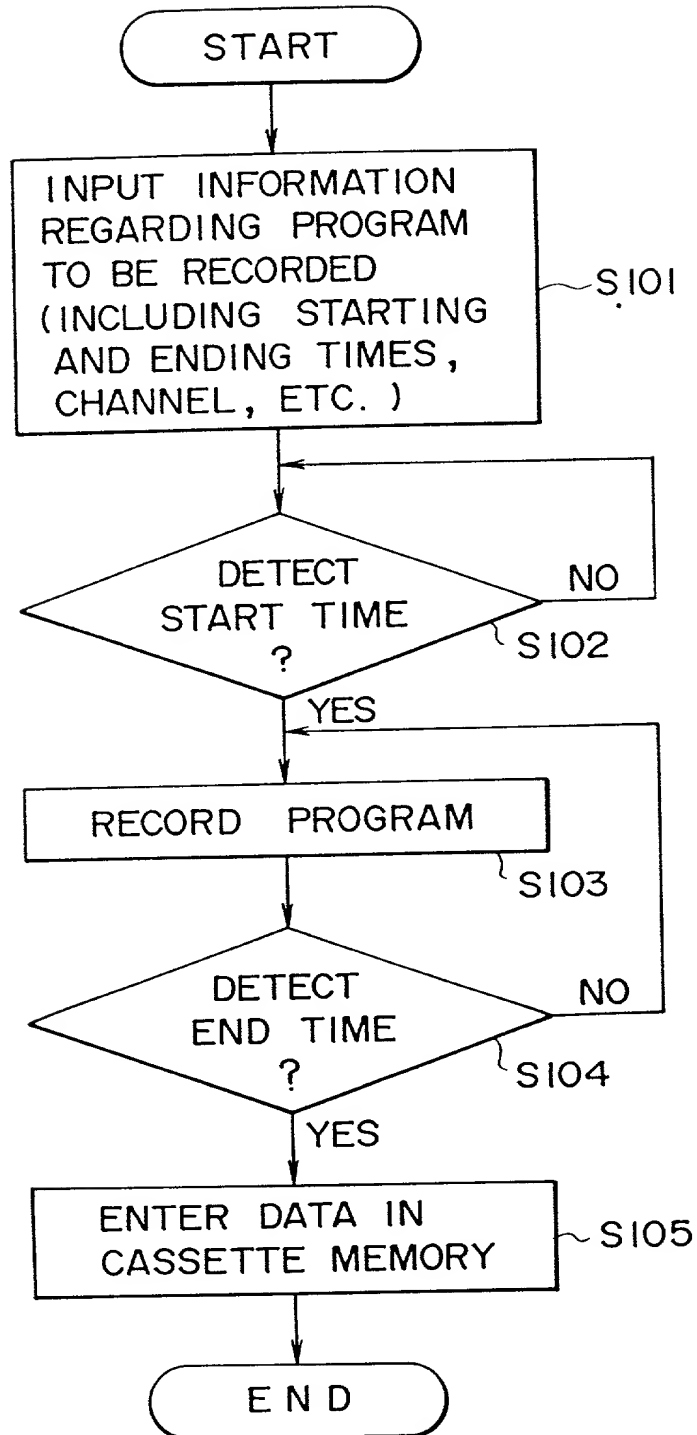


FIG. 32



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FIG. 33

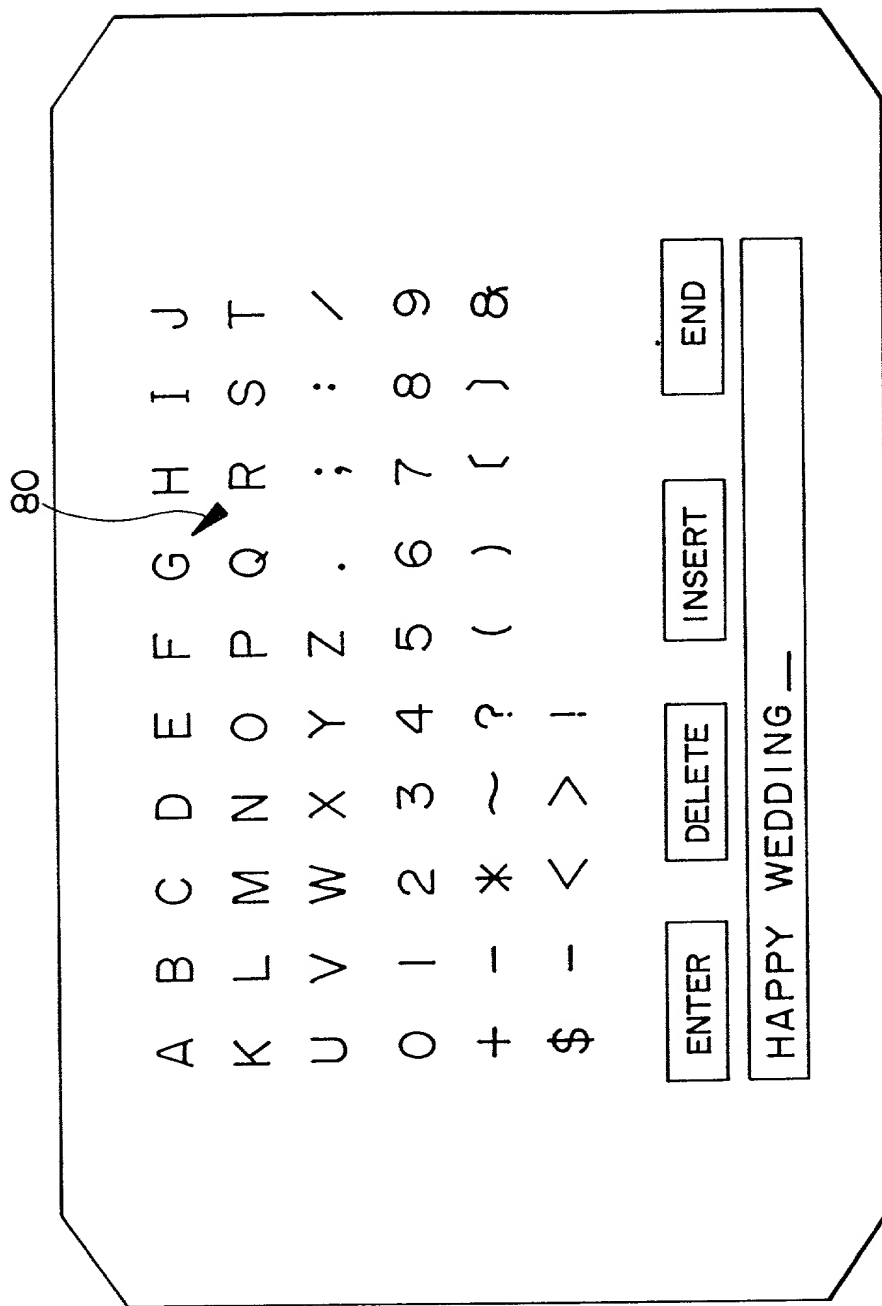


FIG. 34

CASSETTE No. : 3 93.6.14 PM 7:31

CASSETTE TITLE: AMUSEMENT

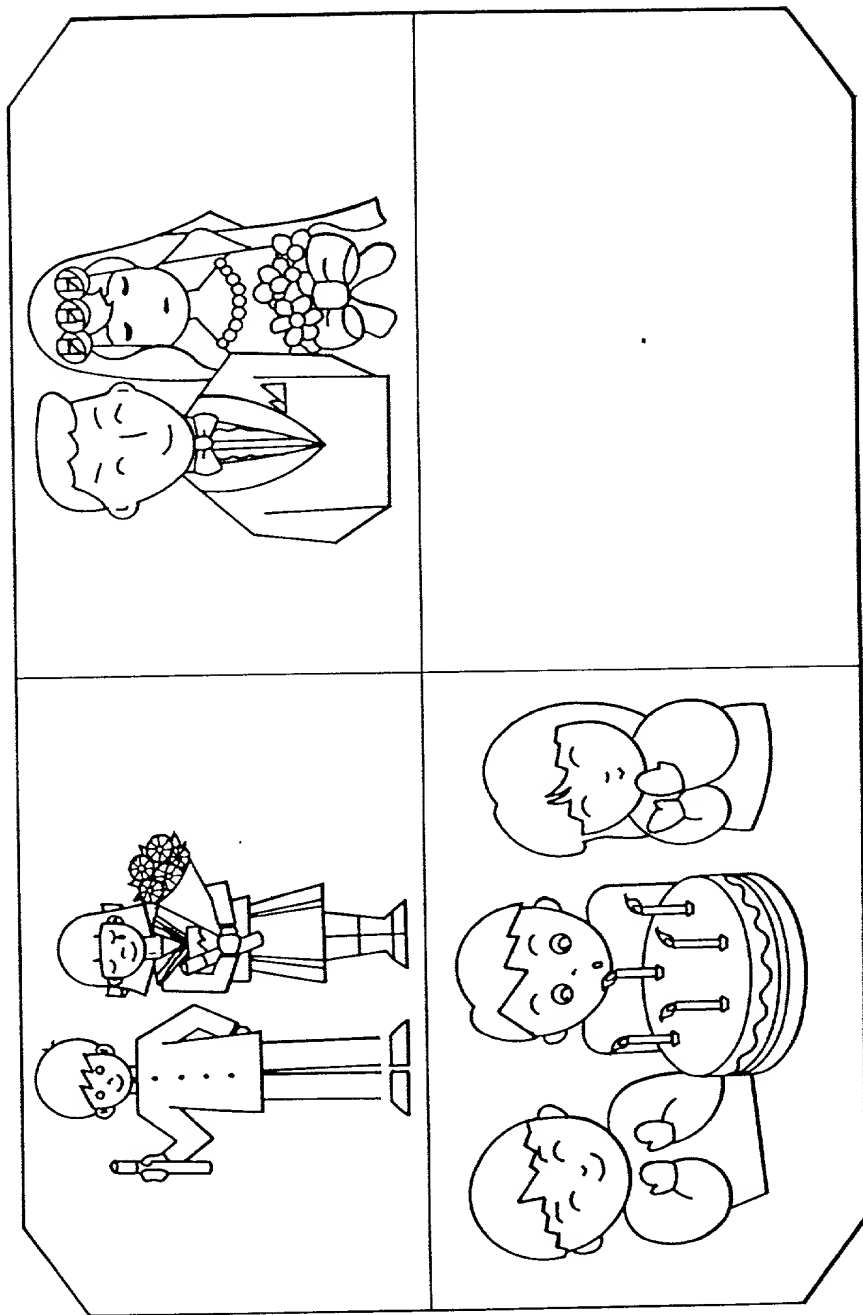
REMAIN TIME 0h21m

PROGRAM No.	DATE	PROGRAM NAME	TIME	CATEGORY
1.	1. Jun.	STAR WARS	1h58m	MOVIE
2.	2. Jul.	RAMBO	2h11m	MOVIE
3.	4. Sep.	MICHAEL JACKSON	0h30m	MUSIC

PROGRAM 1.	PROGRAM 2.	PROGRAM 3.	NO RECORDING
------------	------------	------------	--------------

SONY VIDEO CASSETTE

FIG. 35





DECLARATION FOR PATENT APPLICATION (JOINT OR SOLE)
(Under 37 CFR § 1.63; with Power of Attorney)
CURTIS, MORRIS & SAFFORD, P.C. File No. 45-0100.2828

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name,
I believe I am the original, first and sole inventor (if only one name is listed below) or an
original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed
and for which a patent is sought on the invention ENTITLED:

RECORDING MEDIUM CARTRIDGE WITH MEMORY CIRCUIT

the specification of which

X is attached hereto.

_____ was filed on _____ as Application Serial No. _____,

with amendment(s) through _____ (if applicable, give dates).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Sec. 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s) Number:	Country:	Filed (Day/Month/Year):	Priority Claimed: Yes No
04-217503	Japan	24 07 92	X

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Sec. 1.56, which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. Application(s) Appln. Ser. No.:	Filed (Day/Month/Year):	Status:(patented, pending, abandoned):
---	-------------------------	--

I hereby appoint WILLIAM S. FROMMER, Registration No. 25,506,

and ALVIN SINDERBRAND, Registration No. 16,313, and CURTIS, MORRIS & SAFFORD, P.C., Registration No. 12,761, or their duly appointed associate, my attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to file continuation and divisional applications thereof, to receive the Patent, and to transact all business in the Patent and Trademark Office and in the Courts in connection therewith, and specify that all communications about the application are to be directed to the following correspondence address:

WILLIAM S. FROMMER, Esq.
c/o CURTIS, MORRIS & SAFFORD, P.C.
530 Fifth Avenue
New York, New York 10036

Direct all telephone calls
to: (212) 840-3333 to the
attention of:

WILLIAM S. FROMMER

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

INVENTOR(S):

Signature: Teruhiko Kori Date: July 14, 1993
Full name of sole or first inventor: TERUHIKO KORI
Residence: Kanagawa, Japan
Citizenship: Japan

Signature: Harumi Kawamura Date: July 14, 1993
Full name of 2nd joint inventor (if any): HARUMI KAWAMURA
Residence: Tokyo, Japan
Citizenship: Japan

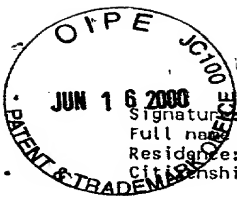
Signature: Hisato Shima Date: July 15, 1993
Full name of 3rd joint inventor: HISATO SHIMA
Residence: Chiba, Japan
Citizenship: Japan

[Similarly list additional inventors on separate page]

Post Office Address(es) of inventor(s): SONY CORPORATION, 7-35 Kitashinagawa 6-chome,
(if different from residence) Shinagawa-KU, Tokyo, Japan

Note: In order to qualify for reduced fees available to Small Entities, each inventor and any other individual or entity having rights to the invention must also sign an appropriate separate "Verified Statement (Declaration) Claiming for Supporting a Claim by Another for Small Entity Status" form [e.g. for Independent Inventor, Small Business Concern, Nonprofit Organization, individual Non-Inventor].

09596174-061600



DECLARATION FOR PATENT APPLICATION (continued) 450100.2828

Signature: Kazuyuki Ogawa Date: July 15, 1993
Full name of 4th joint inventor: KAZUYUKI OGAWA
Residence: Kanagawa, Japan
Citizenship: Japan

Signature: _____ Date: _____
Full name of 5th joint inventor: _____
Residence: _____
Citizenship: _____

Signature: _____ Date: _____
Full name of 6th joint inventor: _____
Residence: _____
Citizenship: _____

Signature: _____ Date: _____
Full name of 7th joint inventor: _____
Residence: _____
Citizenship: _____

Post Office Address(es) of inventor(s):
[if different from residence]

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P.O. Box 5100, Tokyo Intl.
Tokyo 100-31, JAPAN

Prior Foreign Application(s) [additional]:

Number:	Country:	Filed (Day/Month/Year):	Priority Claimed Yes No
---------	----------	-------------------------	-------------------------------

Prior U.S. Application(s) [additional]:

Appln. Ser. No.:	Filed (Day/Month/Year):	Status: (patented, pending, abandoned)
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09596174-061600